

The Impact of Civil Servants' Digital Competence on Online Public Service Delivery: Evidence from Ho Chi Minh City, Vietnam

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ABSTRACT: Digital transformation has become a critical priority for improving public service delivery; however, the effectiveness of online public services depends not only on technological infrastructure but also on the digital competencies of civil servants who operate digital government systems. This study examines the effects of civil servants' digital competence dimensions on the effectiveness of online public service delivery in ward-level local government agencies in Ho Chi Minh City, Vietnam. Drawing on the Digital Competence Framework (DigComp) and the Resource-Based View (RBV), this study develops a research model consisting of five dimensions of digital competence: digital awareness, information and data literacy, digital tools and systems skills, digital communication and collaboration, and information safety and security. A quantitative survey was conducted among 125 civil servants directly involved in administrative procedures and online public service delivery. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. The findings indicate that all five dimensions of digital competence positively influence online public service delivery effectiveness, with information and data literacy showing the strongest effect, followed by information safety and security and digital tools and systems skills. The model explains 28.6% of the variance in online public service delivery effectiveness and demonstrates acceptable predictive capability. This study contributes to digital government research by highlighting digital competence as a multidimensional organizational capability and provides practical implications for developing targeted competency-based training programs for civil servants in local government.

KEYWORDS: digital competence; civil servants; online public service delivery; digital government; local government; Vietnam

1. INTRODUCTION

Digital transformation has fundamentally reshaped public administration worldwide, prompting governments to redesign how public services are organized, delivered, and managed. As digital technologies become increasingly integrated into government operations, digital government has emerged as a strategic approach for enhancing administrative efficiency, transparency, accessibility, and citizen-centered governance. Among its most significant outcomes, online public service delivery enables governments to provide faster, more efficient, and more accessible public services while reducing administrative burdens for citizens and businesses.

Despite substantial investments in digital infrastructure and e-government platforms, the effectiveness of online public service delivery continues to vary considerably across public organizations. This challenge has become particularly significant in Vietnam following the implementation of the two-tier local government model in July 2025, which restructured local administrative systems and expanded the responsibilities of commune-level governments. As administrative workloads increase under this new governance model, civil servants are expected to process a growing number of administrative procedures through digital platforms while maintaining service quality, efficiency, and responsiveness. Nevertheless, technological investment alone is insufficient to ensure successful digital transformation. The effectiveness of online public service delivery ultimately depends on the ability of civil servants to utilize digital technologies, manage digital information, collaborate through digital platforms, and safeguard information security throughout administrative processes. Strengthening civil servants' digital competence has therefore become a strategic priority for improving public service performance in digitally transformed local governments.

Although digital competence has attracted growing scholarly attention, existing studies have predominantly focused on employees in private organizations or examined digital transformation from technological and organizational perspectives. Empirical evidence concerning civil servants, particularly those working in local governments, remains limited. Furthermore, relatively few studies have examined how different dimensions of digital competence contribute to the effectiveness of online public service delivery. This research gap is especially relevant in Vietnam, where recent local government restructuring and the acceleration of digital government reforms have substantially increased the demand for civil servants capable of performing effectively in digital

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administrative environments. A better understanding of the specific digital competencies that enhance online public service delivery is therefore essential for both theory development and evidence-based public sector reforms.

In response to these research gaps, this study examines the effects of five dimensions of civil servants' digital competence - digital awareness, information and data literacy, digital tools and systems skills, digital communication and collaboration, and information safety and security - on the effectiveness of online public service delivery. Drawing on the Resource-Based View (RBV) and the European Commission's Digital Competence Framework for Citizens (DigComp 2.2), the study develops and empirically tests a research model using Partial Least Squares Structural Equation Modeling (PLS-SEM).

This study makes three primary contributions to the literature. First, it extends the application of the Resource-Based View by conceptualizing civil servants' digital competence as a strategic organizational capability that enhances online public service delivery in the public sector. Second, it enriches the digital government literature by providing empirical evidence on how distinct dimensions of digital competence contribute differently to service delivery effectiveness, rather than treating digital competence as a single, homogeneous construct. Third, by examining civil servants operating within Vietnam's newly restructured two-tier local government system, the study provides timely evidence from an emerging digital government context and offers practical implications for strengthening digital competencies to improve the quality and effectiveness of online public services.

2. LITERATURE REVIEW, THEORETICAL FOUNDATION AND HYPOTHESIS DEVELOPMENT

2.1. Digital government

Digital government has become a central pillar of public sector reform, enabling governments to redesign administrative processes and improve the delivery of public services through digital technologies. According to the OECD (2020; 2023), digital government extends beyond the digitalization of administrative procedures. It represents a data-driven and citizen-centered approach to public governance in which digital technologies are strategically employed to enhance transparency, responsiveness, efficiency, and public value. Rather than serving merely as technological tools, digital platforms facilitate organizational transformation by reshaping how governments interact with citizens and deliver public services.

One of the most significant outcomes of digital government is the expansion of online public services. The United Nations E-Government Survey (2024) highlights that digital service delivery enables governments to improve service accessibility, reduce administrative processing time and transaction costs, and provide more convenient and transparent services to citizens and businesses. However, the successful implementation of digital government depends not only on investments in digital infrastructure but also on the organizational capability to utilize digital technologies effectively. Consequently, governments with similar technological resources may achieve markedly different service outcomes depending on how effectively these resources are deployed within public organizations.

In Vietnam, digital transformation has become a national strategic priority through major initiatives such as the National Digital Transformation Program (Decision No. 749/QĐ-TTg), the National Public Service Portal, Project 06, and the development of integrated national databases. More recently, the implementation of the two-tier local government model on 1 July 2025 has substantially increased the responsibilities of commune-level governments, requiring civil servants to process a growing volume of administrative procedures through digital platforms while maintaining service quality, efficiency, and responsiveness. Under these circumstances, the effectiveness of digital government increasingly depends on the capability of civil servants to operate in digital administrative environments rather than on technological infrastructure alone.

Therefore, the success of digital government is ultimately determined by the extent to which public organizations can transform technological investments into effective public service outcomes. As civil servants are the primary actors responsible for implementing digital government initiatives and delivering online public services, their digital competence has become a critical organizational capability for achieving effective digital public service delivery. This perspective provides the foundation for examining digital competence as a key determinant of online public service delivery effectiveness.

2.2. Digital competence of civil servants

Digital competence has become an essential capability for public sector employees as governments increasingly rely on digital technologies to modernize administrative processes and improve public service delivery. Beyond the ability to operate digital tools, civil servants are expected to integrate digital technologies into their daily work, manage digital information effectively, collaborate through digital platforms, and adapt to rapidly evolving digital environments. Consequently, digital competence is widely recognized as a critical organizational capability that supports successful digital transformation and enhances public sector performance.

The concept of digital competence has evolved from a narrow focus on technical proficiency to a broader multidimensional construct encompassing knowledge, skills, attitudes, and ethical awareness required to use digital technologies effectively, critically, and responsibly (UNESCO, 2018). In addition to technical skills, digital competence includes information management, digital communication, collaboration, problem-solving, and information security, enabling individuals to perform effectively in

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increasingly digitalized workplaces.

Among the existing frameworks, the European Digital Competence Framework for Citizens (DigComp 2.2) developed by the European Commission (2022) is one of the most comprehensive and widely adopted models for conceptualizing digital competence. DigComp 2.2 identifies five core competence areas: information and data literacy, communication and collaboration, digital content creation, safety, and problem solving. Owing to its robust conceptual foundation and broad applicability, the framework has been extensively adopted in studies of education, workforce development, digital transformation, and public administration.

Nevertheless, the competencies required of civil servants differ from those expected of the general population because public sector employees operate within a highly regulated institutional environment. In addition to using digital technologies, civil servants must process administrative information accurately, coordinate tasks through integrated digital platforms, comply with legal and procedural requirements, and ensure information security throughout service delivery. Recognizing these distinctive responsibilities, the Ministry of Science and Technology of Vietnam (2025) introduced the Basic Digital Knowledge and Skills Framework for Public Officials and Civil Servants, which adapts international digital competence standards to the specific requirements of Vietnam's public sector.

Drawing upon DigComp 2.2 (European Commission, 2022) and Vietnam's Basic Digital Knowledge and Skills Framework (2024), this study conceptualizes civil servants' digital competence as the set of knowledge, skills, and capabilities that enable public officials to perform administrative duties effectively in digital environments and enhance online public service delivery. Consistent with this conceptualization, digital competence is operationalized through five distinct dimensions: digital awareness, information and data literacy, digital tools and systems skills, digital communication and collaboration, and information safety and security. Rather than representing a higher-order construct, these dimensions are examined as independent organizational capabilities that may contribute differently to the effectiveness of online public service delivery.

2.3. Online public service delivery effectiveness

Online public service delivery has become a fundamental component of digital government, reflecting governments' ability to provide administrative services efficiently, transparently, and conveniently through digital platforms. Unlike traditional public service delivery, which relies heavily on face-to-face interactions and paper-based procedures, online public service delivery enables citizens and businesses to access public services remotely, submit applications electronically, monitor processing progress, and receive administrative results through integrated digital systems. Consequently, the effectiveness of online public service delivery has emerged as a key indicator of digital government performance and public sector modernization.

The effectiveness of online public service delivery extends beyond the mere availability of digital platforms. It reflects the extent to which digital public services achieve their intended objectives by delivering services that are timely, accurate, reliable, accessible, and responsive to users' needs. According to the OECD (2023), effective digital public services should improve administrative efficiency while enhancing transparency, accountability, and citizen satisfaction. Similarly, the United Nations E-Government Survey (2024) emphasizes that successful online public service delivery requires governments not only to digitalize administrative procedures but also to ensure that digital services remain user-centered, inclusive, secure, and capable of meeting citizens' evolving expectations.

In the public administration literature, the effectiveness of online public service delivery is influenced by multiple organizational factors, including technological infrastructure, institutional support, administrative processes, leadership, and human resource capabilities. Among these factors, the digital competence of civil servants has received increasing attention because digital technologies can generate public value only when public employees possess the knowledge and skills required to utilize them effectively in administrative practice. Civil servants with stronger digital competence are better equipped to process digital information accurately, operate integrated information systems, collaborate through digital platforms, respond efficiently to citizens' requests, and maintain information security throughout service delivery. Consequently, digital competence represents a strategic organizational capability for improving the quality and effectiveness of online public services.

In this study, online public service delivery effectiveness is defined as the extent to which civil servants successfully utilize digital technologies to deliver administrative services that are efficient, accurate, timely, secure, and responsive to citizens' needs. This construct serves as the endogenous variable of the research model, representing the overall performance of online public service delivery as perceived by civil servants responsible for providing digital public services.

2.4. Resource-based view

The Resource-Based View (RBV), originally proposed by Barney (1991), posits that organizational performance is primarily determined by the effective acquisition, development, and deployment of valuable organizational resources and capabilities. Unlike traditional perspectives that emphasize external market conditions, RBV argues that sustainable performance advantages arise from internal resources that are valuable, rare, difficult to imitate, and effectively organized. Although initially developed

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within the field of strategic management, RBV has been increasingly applied in public sector research to explain how organizational capabilities contribute to improved public service performance and successful organizational transformation.

Within the context of digital government, technological infrastructure alone is insufficient to improve public sector performance. Digital technologies create value only when public organizations possess the human capabilities required to utilize them effectively in administrative practice. Consequently, civil servants' digital competence represents a critical organizational capability that enables governments to transform technological resources into more efficient, responsive, and reliable online public services. This perspective is particularly relevant in local governments, where civil servants are directly responsible for implementing digital government initiatives and delivering public services through digital platforms.

From the RBV perspective, civil servants' digital competence constitutes an intangible strategic resource that enhances organizational performance by improving the effectiveness of online public service delivery. Competencies such as digital awareness, information and data literacy, digital tools and systems skills, digital communication and collaboration, and information safety and security enable civil servants to perform administrative tasks more efficiently, process digital information accurately, collaborate across digital environments, and ensure secure service delivery. Collectively, these capabilities strengthen the capacity of local governments to provide high-quality digital public services and respond more effectively to citizens' needs.

Accordingly, this study adopts the Resource-Based View as the principal theoretical foundation to explain the relationship between civil servants' digital competence and online public service delivery effectiveness. Drawing on RBV, the five dimensions of digital competence are conceptualized as strategic organizational capabilities that contribute to improving the effectiveness of online public service delivery. Based on this theoretical foundation, the following hypotheses are proposed.

2.5. Hypothesis development

2.5.1. Digital awareness and online public service delivery effectiveness

Digital awareness reflects civil servants' recognition of the importance of digital technologies and their willingness to integrate digital solutions into administrative practices. As a fundamental dimension of digital competence, digital awareness shapes employees' attitudes toward digital transformation and influences their readiness to adopt new digital processes.

Previous studies have indicated that digital awareness and readiness are important determinants of successful digital transformation in public organizations. Vasilieva et al. (2018) demonstrated that employees' awareness and readiness toward digital transformation contributed significantly to organizational effectiveness. Similarly, Ingsih et al. (2024) found that stronger digital awareness enabled employees to adapt more effectively to digital working environments, thereby improving work outcomes.

In the context of local governments, civil servants' awareness of digital transformation determines their willingness to utilize online public service platforms and adapt administrative procedures to digital environments. Higher digital awareness encourages proactive technology adoption and facilitates more effective implementation of online public services. Therefore, this study proposes:

H1: Digital awareness positively influences the effectiveness of online public service delivery.

2.5.2. Information and data literacy and online public service delivery effectiveness

Information and data literacy refers to civil servants' ability to identify, collect, evaluate, manage, and utilize digital information effectively in performing administrative tasks. This capability is particularly important in digital government environments, where administrative decisions and online public service delivery increasingly depend on the accurate processing, integration, and use of digital information.

Previous research has emphasized the importance of information-related competencies in public organizations. de Jong et al. (2024) highlighted that effective information governance in public administration requires employees to possess competencies related to managing, evaluating, and utilizing information resources effectively. Similarly, Tuoi and Thanh (2023) demonstrated that digital capabilities, including information management skills, significantly enhanced the work performance of Vietnamese provincial civil servants.

In the context of online public service delivery, information and data literacy enables civil servants to process electronic documents accurately, retrieve relevant information efficiently, and reduce errors during administrative procedures. Civil servants with stronger information and data literacy are therefore better able to transform digital information resources into effective administrative outcomes, thereby improving the efficiency and reliability of online public services. Accordingly, this study proposes:

H2: Information and data literacy positively influences the effectiveness of online public service delivery.

2.5.3. Digital tools and systems skills and online public service delivery effectiveness

Digital tools and systems skills represent civil servants' ability to operate digital platforms, administrative information systems,

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electronic document management systems, and other technological applications required for government operations.

Prior studies have confirmed the importance of operational digital skills in facilitating digital government implementation. Nguyen and Süß (2023) found that local government employees with stronger digital technology capabilities were more successful in adopting digital government initiatives. Similarly, Nguyen and Thanh (2023) demonstrated that digital capabilities positively influenced the work performance of Vietnamese public servants.

From the Resource-Based View (RBV), digital tools and systems skills can be considered an organizational capability that allows public organizations to effectively utilize digital resources. In local governments, where administrative procedures are increasingly conducted through integrated digital systems, civil servants' ability to operate these systems directly affects processing speed, accuracy, and service continuity. Therefore:

H3: Digital tools and systems skills positively influence the effectiveness of online public service delivery.

2.5.4. Digital communication and collaboration and online public service delivery effectiveness

Digital communication and collaboration refer to civil servants' ability to exchange information, coordinate activities, and collaborate through digital technologies. In digitally transformed public organizations, effective digital interaction is necessary to ensure coordination among departments and maintain seamless administrative workflows (European Commission, 2022).

Empirical studies have demonstrated that digital communication capabilities contribute to improved organizational performance. Tuoi and Thanh (2023) found that digital communication and collaboration enhanced the performance of Vietnamese provincial civil servants by facilitating information sharing and coordination. Similarly, Le and Hoang (2023) showed that digital platforms strengthened knowledge exchange and collaboration in public organizations.

In online public service delivery, administrative procedures often require coordination among multiple units through interconnected digital systems. Therefore, civil servants with stronger digital communication and collaboration skills can facilitate timely information exchange, improve interdepartmental coordination, and enhance service delivery effectiveness. Accordingly:

H4: Digital communication and collaboration positively influence the effectiveness of online public service delivery.

2.5.5. Information safety and security and online public service delivery effectiveness

Information safety and security refer to civil servants' ability to protect digital information, comply with cybersecurity requirements, and maintain confidentiality, integrity, and availability of administrative data. This capability is increasingly important as online public services involve extensive processing of citizens' personal and administrative information.

Recent studies emphasize the role of security competencies in ensuring reliable digital government operations. Chen et al. (2024) found that information security awareness among grassroots civil servants improved secure information practices. Similarly, Tran et al. (2024) demonstrated that cybersecurity awareness positively influenced protective behaviors among Vietnamese public servants.

From the RBV perspective, information safety and security represent a critical organizational capability that protects digital resources and ensures sustainable digital service operations. In local governments, effective security practices help prevent information risks, maintain citizens' trust, and ensure the reliability of online public services. Hence:

H5: Information safety and security positively influences the effectiveness of online public service delivery.

3. METHODOLOGY

3.1. Research design

This study employed a quantitative research design to examine the effects of civil servants' digital competence on the effectiveness of online public service delivery. A cross-sectional survey was conducted among civil servants working in commune-level local government agencies in Ho Chi Minh City, Vietnam. The quantitative approach was appropriate because the study aimed to test the relationships among multiple latent constructs and empirically validate the proposed research model.

The research model was developed based on the Digital Competence Framework for Citizens (DigComp 2.2) and the Resource-Based View (RBV). Although DigComp 2.2 was initially designed to assess citizens' digital competence, its competency dimensions have been widely adapted to evaluate digital capabilities in organizational contexts. Accordingly, this study examined five dimensions of civil servants' digital competence: digital awareness, information and data literacy, digital tools and systems skills, digital communication and collaboration, and information safety and security. The effectiveness of online public service delivery was specified as the dependent construct.

Given the prediction-oriented nature of the study and the examination of multiple latent constructs, Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed using SmartPLS 4. PLS-SEM is suitable for analyzing complex structural relationships with relatively small samples and fewer distributional assumptions (Hair et al., 2022). The analysis followed a two-stage approach, including measurement model assessment and structural model evaluation.

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3.2. Measurement development

The measurement items were adapted and contextualized from established theoretical frameworks and previous empirical studies to ensure content validity. Civil servants' digital competence was measured through five dimensions derived from the Digital Competence Framework for Citizens (DigComp 2.2) (European Commission, 2022), including digital awareness, information and data literacy, digital tools and systems skills, digital communication and collaboration, and information safety and security. The measurement items were adapted to reflect the specific tasks and digital practices of civil servants involved in online public service delivery in Vietnam's local government context.

The dependent construct, effectiveness of online public service delivery, was adapted from previous studies on digital government service performance and public service delivery effectiveness (OECD, 2020; Mensah, 2019; Alkraihi & Ameen, 2022). The items were contextualized to capture the effectiveness of online public service delivery from the perspective of civil servants, including aspects related to efficiency, accuracy, responsiveness, and service outcomes.

To ensure contextual appropriateness, the questionnaire was reviewed by experts in public administration and pilot-tested with civil servants before the main survey. Minor revisions were made based on expert and respondent feedback. All constructs were measured using reflective indicators on a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The measurement constructs and their theoretical foundations are presented in **Table 1**

Table 1. Measurement Constructs and Measurement Basis

Construct	Code	No. of Items	Measurement Basis
Digital Awareness	DA	4	Adapted and contextualized based on European Commission (2022), Vasilieva et al. (2018), and Ingsih et al. (2024)
Information and Data Literacy	IDL	5	Adapted and contextualized based on European Commission (2022), Ongena et al. (2023), and Nguyen & Thanh (2023).
Digital Tools and Systems Skills	DTS	5	Adapted and contextualized based on European Commission (2022), Nguyen & Süß (2023), and Nguyen & Thanh (2023).
Digital Communication and Collaboration	DCC	5	Adapted and contextualized based on European Commission (2022), Nguyen & Thanh (2023), and Le & Hoang (2023).
Information Safety and Security	ISS	5	Adapted and contextualized based on European Commission (2022), Chen et al. (2024), and Tran et al. (2024).
Online Public Service Delivery Effectiveness	OPSD	5	Adapted and contextualized based on OECD (2020), Mensah (2019), and Alkraihi & Ameen (2022).

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3.3. Data Collection

Data were collected through a structured questionnaire administered to civil servants working in selected ward-level People's Committees in Ho Chi Minh City, Vietnam. The target respondents were civil servants directly involved in administrative procedures and online public service delivery, as they had practical experience in using digital technologies and government information systems in their daily tasks.

A non-probability convenience sampling method was employed due to the accessibility of respondents within local government agencies. Before the main survey, the questionnaire was reviewed by experts in public administration and pilot-tested with a small group of civil servants to assess the clarity and contextual relevance of the measurement items. Necessary revisions were made based on the feedback received.

The official survey was conducted from January to April 2026. A total of 120 valid responses were collected and used for data analysis after excluding incomplete questionnaires. Participation was voluntary, and respondents were informed about the academic purpose of the study. Anonymity and confidentiality were ensured, and no personally identifiable information was collected.

3.4. Data Analysis

The collected data were analyzed using IBM SPSS Statistics 21 and SmartPLS

4. SPSS was used for data screening, descriptive statistics, and preliminary reliability analysis using Cronbach's alpha. Subsequently, Partial Least Squares Structural Equation Modeling (PLS-SEM) was conducted using SmartPLS 4 to evaluate the measurement model and structural model.

PLS-SEM was selected because it is appropriate for prediction-oriented research, theory development, and models involving multiple latent constructs with relatively small sample sizes (Hair et al., 2022). The measurement model was assessed based on indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Specifically, outer loadings, Cronbach's alpha, Composite Reliability (CR), Average Variance Extracted (AVE), and the Heterotrait - Monotrait ratio (HTMT) were examined.

After establishing the adequacy of the measurement model, the structural model was evaluated by examining collinearity issues (VIF), path coefficients, coefficients of determination (R^2), effect sizes (f^2), and predictive relevance (Q^2). The significance of hypothesized relationships was assessed using bootstrapping with 5,000 resamples. In addition, the model's predictive capability was evaluated using PLSpredict. Hypotheses were supported when the estimated path coefficients were statistically significant at $p < 0.05$.

4. RESULTS

4.1 Respondent profile

The demographic characteristics of the respondents are presented in **Table 2**. A total of 120 valid questionnaires were included in the analysis. The respondents were civil servants working in selected ward-level People's Committees in Ho Chi Minh City who were directly involved in handling administrative procedures and delivering online public services.

Regarding gender, the sample consisted of 61 male respondents (50.8%) and 59 female respondents (49.2%), indicating a relatively balanced gender distribution. In terms of age, most respondents were 30 - 40 years old (59.2%), while the remaining 40.8% were aged 41- 50 years. Regarding educational attainment, the majority of respondents held a bachelor's degree (89.2%), whereas 10.8% possessed a master's degree.

With respect to years of service, 37.5% of the respondents had 11 - 20 years of experience, followed by 33.3% with less than 5 years, 26.7% with 6 - 10 years, and 2.5% with more than 20 years of service. Overall, the sample represents civil servants with diverse professional experience, providing an appropriate basis for evaluating the proposed research model.

Table 2. Demographic characteristics of respondents

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	61	50.8
	Female	59	49.2
Age	30 - 40 years	71	59.2
	41 - 50 years	49	40.8
Educational Level	Bachelor's degree	107	89.2

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	Master's degree	13	10.8
Years of Service	Less than 5 years	40	33.3
	6 - 10 years	32	26.7
	11 - 20 years	45	37.5

4.2 Assessment of the Measurement Model

The measurement model was assessed by examining indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. As presented in **Table 3**, all constructs demonstrated satisfactory internal consistency, with Cronbach's alpha values ranging from 0.764 to 0.827 and composite reliability values ranging from 0.838 to 0.877, exceeding the recommended threshold of 0.70. Furthermore, the average variance extracted (AVE) values ranged from 0.515 to 0.628, indicating adequate convergent validity. Although several indicators showed outer loadings below 0.70, they were retained because the overall construct reliability and convergent validity remained satisfactory.

Table 3. Reliability and convergent validity assessment

Construct	Cronbach's α	rho_A	CR	AVE
DA	0.809	0.867	0.870	0.628
DCC	0.800	0.755	0.838	0.517
DTS	0.827	0.843	0.877	0.588
IDL	0.814	0.841	0.864	0.563
ISS	0.769	0.798	0.848	0.584
OPSD	0.764	0.765	0.841	0.515

Note. Cronbach's $\alpha \geq 0.70$; CR ≥ 0.70 ; AVE ≥ 0.50 .

Discriminant validity was evaluated using the heterotrait–monotrait ratio (HTMT). As shown in Table 4, all HTMT values were below the conservative threshold of 0.85, with the highest value being 0.352. Therefore, discriminant validity among the constructs was established.

Table 4. Discriminant validity (HTMT)

Construct	DA	DCC	DTS	IDL	ISS	OPSD
DA						
DCC	0.149					
DTS	0.133	0.094				
IDL	0.125	0.205	0.151			
ISS	0.116	0.186	0.145	0.155		
OPSD	0.261	0.244	0.318	0.352	0.256	

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Note. HTMT = Heterotrait - Monotrait ratio. Discriminant validity is established when HTMT values are below **0.90** (Hair et al., 2022).

4.3 Assessment of the structural model

The structural model was evaluated by examining collinearity, explanatory power (R^2), and effect sizes (f^2). The inner VIF values were first assessed to identify potential multicollinearity among the predictor constructs. As shown in Table 6, all VIF values ranged from 1.007 to 1.036, which were below the recommended threshold of 5, indicating that collinearity was not a concern in the structural model (Hair et al., 2022).

The proposed model explained 28.6% of the variance in online public service delivery effectiveness ($R^2 = 0.286$), indicating a moderate level of explanatory power. Furthermore, all exogenous constructs demonstrated small effect sizes, suggesting that each dimension of digital competence contributed to explaining variations in online public service delivery effectiveness. The effect sizes were interpreted based on the guidelines of Hair et al. (2022)

Table 5. Effect size (f^2)

Structural Path	f^2	Effect size
IDL → OPSD	0.115	Small
ISS → OPSD	0.080	Small
DTS → OPSD	0.070	Small
DA → OPSD	0.067	Small
DCC → OPSD	0.045	Small

Note. β = standardized path coefficient; t = bootstrapping t-statistic; p = significance level. Effect size (f^2) was interpreted according to Hair et al. (2022), where 0.02, 0.15, and 0.35 indicate small, medium, and large effects, respectively.

4.4 Hypothesis Testing

To further examine the structural relationships proposed in the research model, hypothesis testing was conducted using the bootstrapping procedure with 5,000 resamples. As presented in **Table 6**, all five hypothesized relationships were statistically significant, indicating that the five dimensions of digital competence positively influence online public service delivery.

Among the proposed antecedents, Information and Data Literacy (IDL) exhibited the strongest positive effect on online public service delivery ($\beta = 0.292$, $p < 0.001$), highlighting the critical role of civil servants' ability to acquire, evaluate, and utilize digital information in delivering effective online public services. The remaining four dimensions - Information Security Skills (ISS), Digital Tool Skills (DTS), Digital Awareness (DA), and Digital Communication and Collaboration (DCC) - also demonstrated significant positive effects, thereby supporting hypotheses H1, H2, H3, H4, and H5. These findings suggest that strengthening multiple dimensions of digital competence is essential for improving the effectiveness of online public service delivery.

Table 6. Structural model results and hypothesis testing

Hypothesis	Path	VIF	β	t-value	p-value	Decision
H1	DA → OPSD	1.012	0.219	2.732	0.006	Supported
H2	IDL → OPSD	1.036	0.292	4.279	<0.001	Supported
H3	DTS → OPSD	1.007	0.225	2.742	0.006	Supported
H4	DCC → OPSD	1.035	0.182	1.992	0.046	Supported
H5	ISS → OPSD	1.015	0.241	2.804	0.005	Supported

Note. β = standardized path coefficient. VIF = variance inflation factor. Collinearity is considered acceptable when VIF values are below the recommended threshold of 5 (Hair et al., 2022). Hypotheses are supported when t-value > 1.96 and $p < 0.05$ (two-

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tailed). Bootstrapping was performed using 5,000 resamples.

4.5 Predictive power assessment

The predictive performance of the proposed model was evaluated using the PLSpredict procedure following the recommendations of Shmueli et al. (2019). As presented in **Table 7**, all indicators of the endogenous construct produced positive Q^2_{predict} values, ranging from 0.052 to 0.103, indicating that the model possesses satisfactory predictive relevance.

Furthermore, the prediction errors generated by the PLS-SEM model were compared with those of the benchmark linear regression (LM) model. The results show that the PLS-SEM model consistently achieved lower RMSE and MAE values than the LM model across all indicators (HQ1 - HQ5). The PLSpredict results further support the robustness of the proposed model. Consistent with the recommendations of Hair et al. (2022) and Shmueli et al. (2019), the model demonstrates acceptable out-of-sample predictive capability in predicting online public service delivery effectiveness.

Table 7. PLSpredict results

Indicator	Q^2_{predict}	PLS-SEM RMSE	LM RMSE	PLS-SEM MAE	LM MAE
OPSD1	0.103	0.674	0.776	0.519	0.625
OPSD2	0.084	0.652	0.750	0.496	0.590
OPSD3	0.085	0.598	0.694	0.437	0.521
OPSD4	0.084	0.670	0.758	0.516	0.595
OPSD5	0.052	0.622	0.707	0.467	0.563

Note. $Q^2_{\text{predict}} > 0$ indicates predictive relevance. Predictive performance was assessed by comparing the prediction errors of the PLS-SEM model with those of the linear regression (LM) benchmark model. Lower RMSE and MAE values indicate superior predictive performance (Shmueli et al., 2019).

5. DISCUSSION

This study examined the effects of five dimensions of civil servants' digital competence on the effectiveness of online public service delivery in ward-level local government agencies in Ho Chi Minh City, Vietnam. Overall, the findings confirm that digital competence is an important capability contributing to variations in online public service delivery effectiveness in the context of local government digital transformation. However, the results also demonstrate that digital competence is not a homogeneous capability, as different dimensions contribute to service effectiveness at different levels. Among the five dimensions, Information and Data Literacy (IDL) emerged as the strongest predictor, followed by Information Security Skills (ISS) and Digital Tool Skills (DTS). In contrast, Digital Awareness (DA) and Digital Communication and Collaboration (DCC) showed comparatively smaller effects. These findings suggest that improving online public service delivery requires local governments to move beyond general digital transformation awareness and focus on developing the specific competencies that enable civil servants to effectively manage digital information, operate digital systems, and ensure secure service delivery.

The strongest influence of Information and Data Literacy (IDL) highlights the central role of information-related capabilities in digital public service delivery. Online public services are fundamentally information-intensive processes that require civil servants to collect, evaluate, process, and utilize digital information accurately throughout administrative procedures. This finding is consistent with the Digital Competence Framework for Citizens (DigComp 2.1), which identifies information and data literacy as a fundamental dimension of digital competence supporting effective engagement with digital environments (Carretero et al., 2017). Similarly, van Laar et al. (2017) emphasized that information processing skills are among the most critical digital competencies for improving performance in technology-intensive workplaces. Extending these perspectives to the public sector, this study demonstrates that information and data literacy represents a particularly important capability for local civil servants responsible for delivering online public services. This finding is also consistent with Cordella et al. (2024), who argued that digital competencies constitute strategic organizational capabilities supporting successful digital government implementation. In the Vietnamese local government context, where administrative procedures increasingly depend on electronic records, integrated information systems, and digital platforms, civil servants must not only operate technologies but also verify, manage, and interpret digital information effectively. Therefore, strengthening information and data literacy should be considered a

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strategic priority in improving the effectiveness and reliability of online public service delivery.

The significant effects of Digital Tool Skills (DTS) and Information Security Skills (ISS) further demonstrate the importance of operational digital competencies in public sector digital transformation. Digital platforms and electronic administrative systems can only generate improved service outcomes when civil servants possess the ability to use these systems effectively and securely. This finding supports previous research emphasizing that digital transformation success depends not only on technological infrastructure but also on employees' capacity to utilize digital technologies and manage associated risks (van Laar et al., 2017; Cordella et al., 2024). Particularly, the significant contribution of information security skills highlights the importance of protecting citizens' digital information in online public service environments. As local governments increasingly process sensitive administrative data through digital platforms, civil servants' ability to maintain information confidentiality, integrity, and security becomes an essential component of effective service delivery.

Although Digital Awareness (DA) and Digital Communication and Collaboration (DCC) also showed significant positive effects, their relatively smaller coefficients indicate that these competencies may function primarily as enabling conditions rather than direct drivers of service effectiveness. Digital awareness supports civil servants' willingness to accept and engage with digital transformation initiatives, while digital communication and collaboration facilitate coordination and information exchange among administrative actors. However, in the context of Vietnamese local government administration, civil servants' performance is closely associated with their ability to process administrative procedures accurately, efficiently, and securely. Therefore, operational competencies that directly influence daily digital service processes appear to have stronger effects on online public service delivery outcomes. These findings contribute to a more nuanced understanding of digital competence by suggesting that different competency dimensions play distinct roles in organizational performance rather than producing uniform effects.

From a theoretical perspective, this study contributes to the digital government and public sector digital transformation literature in several ways. First, the findings support a multidimensional perspective of digital competence by demonstrating that individual competency dimensions have different levels of influence on online public service delivery effectiveness. Rather than treating digital competence as a single aggregated capability, this study highlights the relative importance of specific competencies required for public service contexts. Second, the study extends the application of DigComp-based digital competence research beyond education and general workplace settings to local government administration, particularly in an emerging digital government context. Third, from the Resource-Based View (RBV) perspective, the findings confirm that civil servants' digital competencies represent valuable internal organizational capabilities that enable local governments to transform digital resources into effective service outcomes. While digital infrastructure provides the foundation for digital government, the ability of civil servants to effectively utilize, manage, and secure digital resources determines whether technological investments can generate meaningful improvements in public service delivery.

The findings also provide important practical implications for policymakers and local government administrators. First, digital competency development programs should prioritize high-impact competencies, particularly information and data literacy, digital tool skills, and information security skills. Rather than providing uniform digital training programs, local governments should adopt competency-based approaches that identify specific capability gaps among civil servants and design targeted training interventions. Second, digital competence should be integrated into broader human resource management practices, including recruitment, performance evaluation, and continuous professional development. Third, investments in digital infrastructure should be accompanied by systematic efforts to strengthen civil servants' capabilities, as technology alone cannot ensure effective online public service delivery. In the context of Vietnam's ongoing administrative reform and local government digital transformation, developing a comprehensive digital competency framework for civil servants can help local governments align technological innovation with organizational capacity building and enhance the sustainability of digital government initiatives.

6. CONCLUSION

This study investigated the effects of five dimensions of digital competence on online public service delivery among civil servants working at ward-level People's Committees in Ho Chi Minh City. Using the PLS-SEM approach, the findings confirmed that all five dimensions of digital competence significantly and positively influence online public service delivery. Among them, Information and Data Literacy emerged as the strongest predictor, followed by Digital Tool Skills, Information Security Skills, Digital Awareness, and Digital Communication and Collaboration. These findings indicate that digital competence is a multidimensional construct in which different competencies contribute unequally to public service performance.

The study contributes to the growing literature on digital government by extending digital competence research to the context of local government administration in Vietnam. It further demonstrates that operational digital competencies exert more direct effects on online public service delivery than enabling competencies, providing new empirical evidence from an emerging digital government context. From a practical perspective, the findings suggest that improving online public service delivery requires not

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only continued investment in digital infrastructure but also systematic efforts to strengthen the digital competencies of civil servants. Prioritizing information and data literacy, digital tool skills, and information security competencies will be essential for enhancing service quality and supporting the successful implementation of digital government initiatives in Vietnam.

7. LIMITATIONS AND FUTURE RESEARCH

Despite its contributions, this study has several limitations that should be acknowledged. First, the research was conducted using a cross-sectional survey of civil servants working in ward-level People's Committees in Ho Chi Minh City. Although the sample provides valuable insights into local government digital transformation, the findings may not be fully generalizable to other provinces or different administrative contexts in Vietnam. Future studies could employ larger and more geographically diverse samples to improve the external validity of the findings.

Second, this study focused exclusively on the direct effects of five dimensions of digital competence on online public service delivery. Other organizational and contextual factors, such as organizational culture, leadership support, digital infrastructure, or employees' attitudes toward technological change, were not incorporated into the proposed model. Future research may develop more comprehensive models by examining mediating or moderating mechanisms that explain how digital competence translates into improved public service performance.

Finally, the study relied on self-reported questionnaire data collected from civil servants, which may be subject to self-report bias and social desirability bias. Given their professional responsibilities and organizational context, respondents may have tended to provide socially desirable responses that reflect expected professional standards rather than their actual practices or perceptions. Although respondent anonymity and confidentiality were emphasized throughout the survey process, this potential bias cannot be entirely eliminated. Future research could address this limitation by combining self-reported survey data with objective performance indicators, supervisor evaluations, or qualitative methods such as interviews and case studies to provide a more comprehensive and robust assessment of digital competence and its influence on online public service delivery.

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