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Original Article

Essential factors driving the adoption of online public services among Hanoi's citizens

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Abstract: This study investigates the factors influencing citizens' intention to use online public services (OPS), focusing on perceived usefulness, trust in security, convenience, ease of use, and technological accessibility. Using a survey of 334 people in Hanoi and the PLS-SEM model, the study analyzes the impact of these factors on user intention through a series of empirical tests. The results reveal that perceived usefulness is the strongest predictor of user intention, supported by significant positive effects from trust in security and perceived convenience. Perceived ease of use shows a positive but less pronounced impact, while technological accessibility has a more minor yet significant effect. These findings align with established theories in technology adoption and provide practical implications for policymakers and service providers. To enhance the adoption of OPS, it is crucial to communicate the benefits of these services, implement robust security measures, and improve user convenience. Addressing technological accessibility is also important but should be complemented by efforts to strengthen other critical factors. This study offers valuable insights for designing and implementing effective OPS.

Keywords: Online public services**,** perceived usefulness**,** trust in security**,** perceived convenience**,** perceived ease of use.

1. Introduction

The digital transformation wave has significantly reshaped public administration globally, with OPS emerging as a cornerstone of modern e-governance (Hooda & Singla, 2018; Ma & Wu, 2020; Piehler et al., 2016). By enabling citizens to access government services electronically, OPS promises enhanced efficiency, transparency, and accessibility, contributing to more responsive and inclusive governance (Alkraiji, 2020; Kwilinski et al., 2024). In Vietnam, particularly in Hanoi, the capital city and a central urban hub, the

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government has vigorously promoted OPS as part of its broader digital transformation strategy (Nguyen et al., 2023; Nguyen et al., 2024). Despite these efforts, the adoption of OPS among Hanoi's citizens has been uneven, with some segments of the population readily embracing these services while others remain hesitant (Nguyen et al., 2020). This variation in adoption rates underscores the need for a deeper understanding of the factors influencing citizens' engagement with OPS.

In the context of Vietnam, while there has been research on e-government adoption (Nguyen et al., 2020; Nguyen et al., 2023)in the context of Vietnam, there remains a noticeable gap in the literature explicitly addressing OPS adoption among citizens in Hanoi. Existing studies focus broadly on e-government initiatives without delving into the unique challenges and opportunities associated with OPS in the Hanoi metropolitan area. Due to its rapid urbanization and the interplay between modern administrative practices and traditional bureaucratic structures, Hanoi presents a distinct case. This urban-rural dynamic and cultural factors unique to Hanoi create a complex environment for the effective rollout and acceptance of OPS.

The absence of detailed research focusing on Hanoi means a limited understanding of how specific local factors, such as varying levels of digital literacy, trust in local government, and socioeconomic disparities, affect OPS adoption and utilization. As Hanoi continues to modernize and integrate digital technologies into public services, addressing this research gap is crucial for developing targeted strategies that cater to the specific needs and conditions of the city's population.

This study aims to fill this gap by exploring the essential factors that drive the adoption of OPS among Hanoi's citizens. This research will identify and analyze the socio-demographic, psychological, and technological factors influencing citizens' willingness and ability to use online public platforms. In doing so, it aims to provide insights that are relevant to Hanoi and applicable to other urban centers in Vietnam and similar developing countries. The study's findings will contribute to the existing body of knowledge on E-government adoption and offer practical recommendations for policymakers and practitioners aiming to enhance OPS uptake.

2. Literature review

2.1. Ground theories

The TAM Model, proposed by Davis (1989), has been widely used to understand technology adoption. According to TAM, when users find technology easy to use and believe it will benefit them, their intention to use it increases. Recent studies have applied TAM to various online services and found that ease of use and usefulness significantly impact users' intentions (Hooda Nandal & Singla, 2018; Wu & Chen, 2005). *Furthermore*, Ajzen's (1991) TPB extends the Theory of Reasoned Action by incorporating perceived behavioral control, attitudes, and subjective norms. In the context of OPS, TPB can explain the impact of trust and convenience on users' intentions. Studies have shown that trust in the security and reliability of online services and perceived convenience are significant predictors of users' behavioral intentions (Wu & Chen, 2005). In addition, Trust and Perceived Risk Theory, as discussed by Mayer et al. (1995), emphasizes that trust plays a crucial role in online interactions. Trust in online services' security, privacy, and reliability can significantly influence users' willingness to use these services. For OPS in Hanoi, trust in the service providers and the overall system is essential for increasing citizens' engagement. Studies have highlighted that perceived risk and trust are critical factors affecting users' decisions to adopt online services (Janssen et al., 2018; Ventre & Kolbe, 2020).

2.2. Hypothesis development

H1: Perceived ease of use of OPS in Hanoi increases citizens' intention to use them.

The hypothesis states that the easier it is for citizens in Hanoi to use OPS, the more likely they are to adopt these services. Ease of use refers to user-friendly, intuitive systems requiring minimal effort to navigate and that are free from technical issues. Based on the TAM by Davis (1989), perceived ease of use significantly influences technology adoption by reducing mental effort and increasing user satisfaction. Horst et al. (2007), confirm that systems

perceived as easy to use enhance user intention. For OPS, simple interfaces and easy navigation are crucial for engagement.

H2: The perceived usefulness of OPS in Hanoi increases citizens' intention to use them.

The hypothesis suggests that if citizens in Hanoi perceive OPS as useful, they are more likely to adopt them. Perceived usefulness refers to the belief that using these services enhances efficiency or quality of life, such as saving time or improving access to resources. Rooted in the TAM by Davis (1989), perceived usefulness is a key factor influencing technology adoption, often more impactful than ease of use. Studies, including (Nguyen et al., 2024) show that recognizing tangible benefits, like reducing physical visits to government offices, increases the likelihood of adopting OPS.

H3: Trust in the security and reliability of OPS in Hanoi increases citizens' intention to use them.

The hypothesis posits that trust in the security and reliability of OPS in Hanoi positively influences citizens' intention to use these services. Trust is vital, as users must feel assured about data protection and system reliability. Rooted in trust theories, particularly in e-commerce and online services, this concept is supported by Hooda et al. (2022) and Horst et al. (2007) who emphasize that secure and consistently performing systems significantly enhance user adoption. For public services handling sensitive data, robust security and reliable performance are crucial for building trust and encouraging usage.

H4: Government support and promotion of OPS in Hanoi increase citizens' intention to use them.

The hypothesis posits that increased government support and promotion of OPS in Hanoi enhances citizens' intention to use these services. This support includes campaigns, training, and subsidies, making OPS more accessible while addressing misconceptions. Rooted in Rogers' Diffusion of Innovations theory (2003), government efforts are crucial for fostering technology adoption by reducing risks and providing necessary information. Research, including studies by Chen et al. (2024) and Nzaramyimana and Susanto (2019), confirms that such initiatives boost awareness and usage of online services, with campaigns and incentives effectively decreasing resistance and increasing adoption rates.

H5: Perceived convenience of accessing and using OPS in Hanoi increases citizens' intention to use them.

The hypothesis suggests that the convenience of accessing and using OPS in Hanoi positively influences citizens' intention to use these services. Convenience, involving ease, speed, and accessibility from any location or time, reduces effort and enhances user adoption. Rooted in the Theory of Reasoned Action (TRA), this concept is supported by Kulal et al. (2024) and Kumar et al. (2024) identifying perceived convenience as a key factor in technology adoption. Studies on mobile banking, e-commerce, and online government services confirm that higher convenience leads to greater adoption rates.

H6: Technological accessibility, including internet connectivity and device availability, increases citizens' intention to use OPS in Hanoi.

The hypothesis asserts that technological accessibility, such as reliable internet connectivity and device availability, significantly influences citizens' intention to use OPS in Hanoi. Studies by Kulal et al. (2024) and Kumar et al. (2024) highlight the critical role of technological resources in adopting new technologies. Improved internet infrastructure and device penetration are essential for increasing OPS usage. In Hanoi, widespread, affordable internet access and user-friendly devices are vital to encouraging higher adoption rates.

The research model is derived from analyzing key factors influencing citizens' intention to use OPS in Hanoi. Each hypothesis identifies a critical variable - such as perceived ease of use, perceived usefulness, trust in security, government support, convenience, and technological accessibility - that impacts user adoption. These factors are supported by established theories like the TAM, TPB, and other theories. By integrating these variables, the model provides a structured framework that explains how these elements interact to shape citizens' intention to adopt OPS. The research model is proposed as shown in Figure 1.

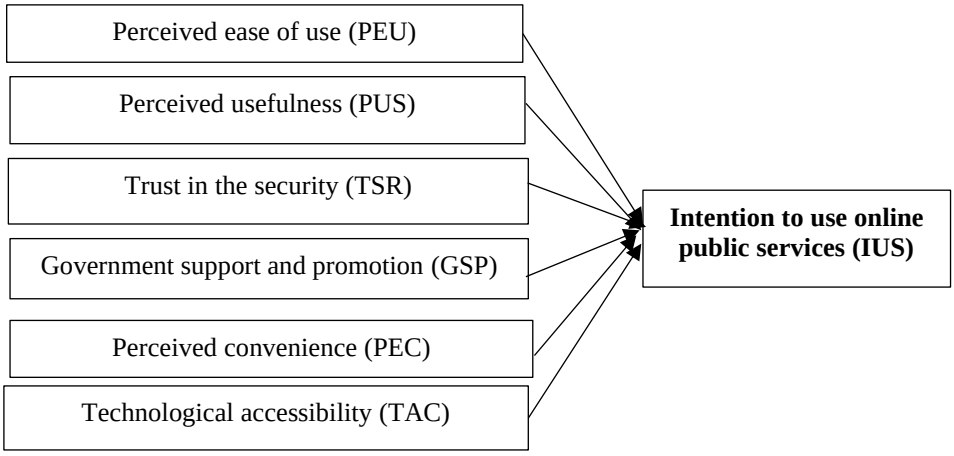

Figure 1: Research model
Source: Author's proposal.

3. Research methodology

3.1. Measurement of research variables

Table 1: Proposed scale table

Factors	Coding	Observed variables	Sources
Perceived ease of use (PEU)	PEU1	The OPS are easy to access.	Davis (1989); Nguyen et al. (2024)
	PEU2	The interface of OPS is user-friendly.	
	PEU3	I find it simple to use OPS without needing help.	
Perceived usefulness (PUS)	PUS1	Using OPS improves my efficiency in handling administrative tasks.	Chen & Aklikokou (2020), Nguyen et al. (2024)
	PUS2	OPS provide clear benefits compared to traditional methods.	
	PUS3	I find that OPS increase my productivity.	
Trust in security and reliability (TSR)	TSR1	I feel confident that my personal information is secure when using OPS.	Hooda et al. (2022), Khan et al. (2021), Ventre & Kolbe (2020)
	TSR2	OPS are reliable and perform consistently well.	
	TSR3	I trust that OPS will function correctly and protect my data.	
Government support and promotion (GSP)	GSP1	The government actively promotes the use of OPS.	Alkraiji (2020), Nguyen et al. (2020)
	GSP2	Government provides adequate support and resources to help citizens use OPS.	
	GSP3	There are effective awareness campaigns about the benefits of OPS.	
Perceived convenience (PEC)	PEC1	OPS are easily accessible from any location.	Alalwan et al. (2018), Nguyen et al. (2020)
	PEC2	Using OPS saves me time compared to in-person visits.	
	PEC3	The process of using OPS is convenient and hassle-free.	
Technological accessibility (TAC)	TAC1	I have reliable internet access to use OPS.	Bertot et al. (2012), Moghaddam & Khatoon-Abadi (2013)
	TAC2	I have access to the necessary devices to use OPS.	
	TAC3	Technical support is available if I encounter problems with accessing OPS.	
Intention to use OPS (IUS)	IUS1	I intend to use OPS in the near future.	Aljazzaf et al. (2020), Piehler et al. (2016), Wirtz et al. (2020)
	IUS2	I plan to regularly use OPS.	
	IUS3	I am likely to use OPS whenever I need them.	
	IUS4	I foresee myself using OPS more frequently in the coming months.	

Source: Author's review.

3.2. Research design and data collection

This study utilizes a quantitative research design to systematically investigate the factors that influence the intention of citizens in Hanoi to use OPS. The core of the research involves a structured survey crafted to capture detailed data on several vital constructs: perceived usefulness, trust in security, perceived convenience, perceived ease of use, and technological accessibility. By focusing on these constructs, the study seeks to understand how each impacts the intention to engage with OPS. The primary objective is to identify and measure the strength and significance of these relationships through rigorous statistical analysis.

The data collection process involved administering an online survey to 334 respondents. The decision to use an online distribution method was driven by the need to reach a broad and diverse audience, ensuring that the sample accurately reflects the general population. The survey was carefully designed to capture various demographic information, including age, gender, family income, and occupation. This demographic segmentation allows for a comprehensive analysis of how different population groups perceive and are influenced by OPS.

3.3. Data analysis method

Data analysis for this study was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM), a method suited for evaluating complex relationships between latent constructs. The model was specified with both measurement and structural components. The measurement model was assessed for reliability and validity using Composite Reliability, Cronbach's Alpha, and Average Variance Extracted (AVE), all meeting acceptable thresholds. Discriminant validity was confirmed through the Fornell-Larcker criteria. The structural model analysis involved examining path coefficients, T statistics, and P values to test the significance of relationships. The results indicated that perceived usefulness had the most substantial impact on the intention to use OPS, followed by trust in security, perceived convenience, perceived ease of use, and technological accessibility, with all relationships being statistically significant. Data processing was performed using SmartPLS software, ensuring robust insights into the factors influencing user intention.

4. Research results

4.1. Characteristics of the research sample

The demographic profile of the survey respondents (Table 2) shows a diverse and predominantly middle-aged group, with a slight majority of male participants. Most respondents fall into lower to middle-income brackets, and their occupations range widely, with office staff, business owners, students, and workers being the most represented. This distribution suggests that the survey captures a broad cross-section of the population, reflecting a variety of economic and professional backgrounds.

Table 2: Demographic profile of respondents

Characteristics		Responses	Percent
Age	Below 22	40	12.0
	22-34	98	29.3
	35-55	131	39.2
	56 and above	65	19.5
Gender	Male	189	56.6
	Female	145	43.4
Family income per person	Below 7 million VND	138	41.3
	From 7-15 million VND	132	39.5
	Higher 15 million VND	64	19.2
Occupation	Students	71	21.3
	Office staff	90	26.9
	Workers	67	20.1
	Business owners	81	24.3
	Others	25	7.5
Total		334	100.0

Source: Author's survey data.

4.2. Assessing the reliability of the variables

The results of Table 3 indicate that the constructs used in the study exhibit good reliability and validity. Most constructs have Cronbach's Alpha values above 0.7, and all have composite reliability scores exceeding 0.8, signifying internal solid consistency and overall reliability. The Average Variance Extracted (AVE) values are all above 0.5, demonstrating good convergent validity. Technological accessibility stands out with exceptionally high scores across all metrics, suggesting it is a well-measured construct in this study. In conclusion, the data supports the robustness of the measurement tools, ensuring the reliability and accuracy of the study's findings.

Table 3: Reliability and validity of constructs

	Cronbach's Alpha	**Composite reliability (rho_a)**	**Composite reliability (rho_c)**	**Average variance extracted (AVE)**
Government support and promotion	0.752	0.787	0.857	0.666
Intention to use OPS	0.847	0.849	0.897	0.687
Perceived convenience	0.679	0.68	0.824	0.609
Perceived ease of use	0.693	0.695	0.83	0.62
Perceived usefulness	0.764	0.799	0.863	0.68
Technological accessibility	0.868	0.924	0.916	0.785
Trust in the security	0.732	0.733	0.848	0.65

Source: Author's research data.

Table 4: Factor loadings for measurement items of constructs

	Government support and promotion	**Intention to use OPS**	**Perceived convenience**	**Perceived ease of use**	**Perceived usefulness**	**Technological accessibility**	**Trust in the security**
GSP1	0.817						
GSP2	0.755						
GSP3	0.873						
IUS1		0.787					
IUS2		0.795					
IUS3		0.891					
IUS4		0.837					
PEC1			0.775				
PEC2			0.774				
PEC3			0.792				
PEU1				0.763			
PEU2				0.782			
PEU3				0.816			
PUS1					0.852		
PUS2					0.733		
PUS3					0.881		
TAC1						0.891	
TAC2						0.844	
TAC3						0.923	
TSR1							0.803
TSR2							0.814
TSR3							0.803

Source: Author's research data.

Table 4 shows that all items exhibit strong factor loadings for their respective constructs, indicating effective measurement. Items related to government support and promotion, intention to use OPS, and perceived convenience have high loadings, ranging from 0.755 to 0.891,

confirming their reliability and relevance. Perceived ease of use and perceived usefulness items also demonstrate strong loadings, ensuring an accurate assessment of these constructs. Technological accessibility items show exceptionally high loadings, further validating this construct. Lastly, trust in the security items also exhibits strong loadings, confirming their effectiveness. Overall, the results affirm that all measurement items are robust and represent their respective constructs appropriately.

4.3. Model analysis results

The finding from Table 5 shows the correlation coefficients among various constructs in the study. Government support, promotion, and intention to use OPS have moderate to strong correlations with each other and their respective internal consistencies. Perceived convenience correlates significantly with the use of OPS and moderate correlations with different constructs. Perceived ease of use and perceived usefulness also display moderate correlations with various constructs, reflecting their relevance in the model. Technological accessibility shows a high correlation with itself but relatively lower correlations with other constructs, suggesting it is more distinct. Trust in security has moderate correlations with several constructs and strong internal consistency. The correlations demonstrate that while some constructs are strongly related, others show distinct or weaker relationships within the model.

Table 5: Correlation matrix

	Government support and promotion	**Intention to use OPS**	**Perceived convenience**	**Perceived ease of use**	**Perceived usefulness**	**Technological accessibility**	**Trust in the security**
Government support and promotion	0.816						
Intention to use OPS	0.554	0.829					
Perceived convenience	0.328	0.545	0.781				
Perceived ease of use	0.524	0.513	0.382	0.787			
Perceived usefulness	0.39	0.604	0.527	0.326	0.824		
Technological accessibility	0.124	0.141	0.009	0.068	0.039	0.886	
Trust in the security	0.326	0.512	0.265	0.261	0.268	0.062	0.806

Source: Author's research data.

Table 6: Path coefficients and significance levels for constructs influencing intention to use OPS

	Original sample (O)	**Sample mean (M)**	**Standard deviation (STDEV)**	**T statistics (|O/STDEV|)**	**P values**
Government support and promotion -> Intention to use OPS	0.19	0.188	0.047	4.042	0
Perceived convenience -> Intention to use OPS	0.188	0.188	0.04	4.713	0
Perceived ease of use -> Intention to use OPS	0.167	0.169	0.045	3.687	0
Perceived usefulness -> Intention to use OPS	0.301	0.301	0.043	7.069	0
Technological accessibility -> Intention to use OPS	0.076	0.078	0.036	2.118	0.034
Trust in the security -> Intention to use OPS	0.271	0.271	0.036	7.499	0

Source: Author's research data.

Table 6 summarizes the hypothesis testing results for factors influencing the intention to use OPS. Original sample coefficients (O) range from 0.076 to 0.301, showing varying relationship strengths. The sample mean (M) closely aligns with these coefficients, indicating stable results, while low standard deviations (STDEV) of 0.036 to 0.047 reflect consistent

estimates. High T statistics (2.118 to 7.499) and P values below 0.05 confirm the statistical significance of all relationships. Overall, the results indicate that perceived usefulness and trust in security have the most substantial positive impacts on the intention to use OPS. At the same time, technological accessibility also shows a significant but more minor effect.

5. Discussion and policy implication

This study's findings (Table 7) offer valuable insights into the factors influencing the intention to use OPS. Each key result aligns with and extends previous research, providing practical implications for policymakers and service providers. All hypotheses are accepted, indicating that various factors significantly influence the intention to use OPS.

Table 7: Summary of accepted hypotheses on factors influencing the intention to use OPS

Hypothesis	Result	Coefficient (O)	T Statistics	P Value
H1: Perceived ease of use → Intention to use OPS	Accepted	0.167	3.687	0
H2: Perceived usefulness → Intention to use OPS	Accepted	0.301	7.069	0
H3: Trust in the security → Intention to use OPS	Accepted	0.271	7.499	0
H4: Government support and promotion → Intention to use OPS	Accepted	0.19	4.042	0
H5: Perceived convenience → Intention to use OPS	Accepted	0.188	4.713	0
H6: Technological accessibility → Intention to use OPS	Accepted	0.076	2.118	0.034

Source: Author's research data.

The results indicate that perceived usefulness has the strongest positive effect on the intention to use OPS, with a coefficient of 0.301. This finding is consistent with the TAM, which emphasizes perceived usefulness as a critical predictor of technology adoption (Davis, 1989). Tejedo-Romero and Araujo (2020) and Zahid et al. (2022) also support this view, noting that the perceived benefits of technology drive user acceptance. To enhance adoption rates, it is essential to communicate the practical benefits and advantages of OPS. Service providers should focus on demonstrating how these services can meet users' needs effectively and improve their daily lives.

Trust in security also shows a significant positive impact on user intention, with a coefficient of 0.271. This finding aligns with Ma and Wu (2020) who highlighted the importance of trust in e-commerce and online services. Trust in security is crucial for user confidence and engagement with online platforms. Policymakers should prioritize the implementation of robust security measures and transparent privacy policies. Ensuring solid data protection and addressing security concerns can foster user trust and increase the adoption of OPS.

Perceived convenience has a positive effect with a coefficient of 0.188, which aligns with previous research, indicating that convenience enhances technology adoption (Hooda et al., 2022; Hung et al., 2020). Users are more likely to adopt services that are easy and convenient to use. To boost adoption, service providers should focus on improving the usability and accessibility of OPS. Streamlining processes and reducing the complexity of service interactions can make these services more attractive and user-friendly.

The impact of perceived ease of use on intention is positive but less pronounced, with a coefficient of 0.167. While earlier studies, such as those by Nguyen and Nguyen (2023), found perceived ease of use to be a significant predictor of technology acceptance, our results suggest it is less critical than perceived usefulness and trust in security in OPS. Although perceived ease of use remains important, enhancing perceived usefulness and security should be prioritized. Ensuring that the online services are easy to use can complement efforts to highlight their usefulness and security features.

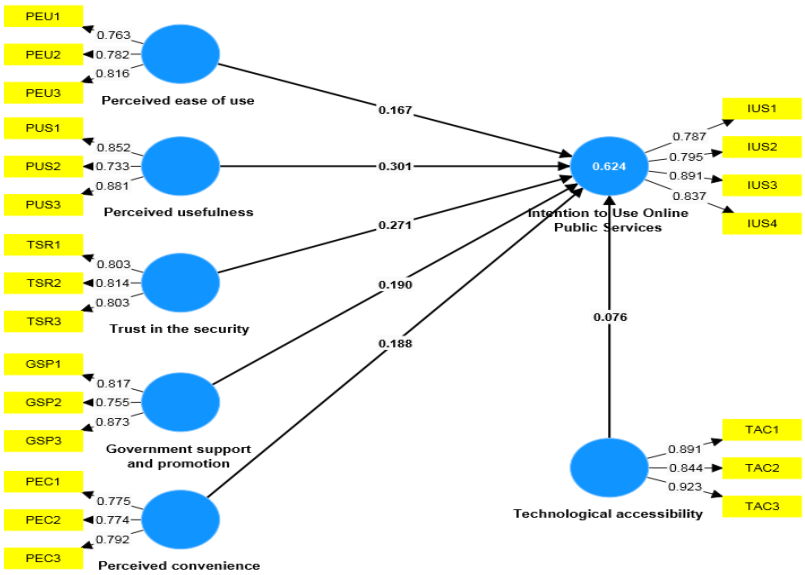

Figure 2: Research model
Source: Author's research data.

Technological accessibility has the most minor but significant impact on the intention to use OPS, with a coefficient of 0.076. This finding supports Ninčević Pašalić and Ćukušić (2024), who noted that access to technology influences service adoption. However, its relatively lower impact suggests that while access is necessary, it is less influential than other factors. Efforts should be made to improve technological infrastructure and ensure widespread access to online services. However, policymakers should focus on enhancing perceived usefulness and trust in security, which substantially impact user intention.

Overall, the study confirms that perceived usefulness, trust in security, and perceived convenience are critical factors in the intention to use OPS. These findings provide actionable insights for policymakers and service providers, emphasizing the need for clear communication of benefits, robust security measures, and user-friendly design to drive greater adoption of OPS.

6. Conclusion and limitations

This study comprehensively analyzes the factors influencing the intention to use OPS, revealing significant insights into user behavior and preferences. This study contributes to the theoretical understanding of technology adoption in OPS by reinforcing the relevance of TAM and TPB and incorporating the concept of trust. By demonstrating that perceived usefulness and trust in security significantly influence users' intentions, the research extends the existing literature on user acceptance of e-government services. Additionally, it highlights the role of perceived convenience and government support, providing a more comprehensive framework for analyzing factors affecting technology adoption. This expanded framework can serve as a foundation for future research, guiding scholars in exploring the interplay of various constructs in the adoption of digital services. Ultimately, the study enhances our understanding of the dynamics between user perceptions and technology acceptance, offering valuable insights for both researchers and practitioners in the field.

The key findings demonstrate that perceived usefulness is the strongest predictor of user intention, aligning with the TAM and underscoring the importance of clearly communicating the benefits of online services. Trust in security also plays a crucial role, highlighting the need for robust security measures to build user confidence. Additionally, perceived convenience significantly affects user intention, emphasizing the importance of making services user-friendly and accessible. Although perceived ease of use has a positive impact, it is less influential than perceived usefulness and trust in security in OPS. Lastly, while technological accessibility has a minor effect, improving access remains essential.

These results offer valuable implications for policymakers and service providers. Enhancing the perceived usefulness of these services, ensuring robust security measures, and improving convenience are essential to foster greater adoption of OPS. Addressing technological accessibility will also support broader adoption, though it should be balanced with efforts to enhance other vital factors. By focusing on these areas, stakeholders can better meet user needs and promote the effective use of OPS.

This study is limited by its focus on Hanoi - a single geographical context, which may restrict the generalizability of the findings to other regions or cultural settings. Future research could explore cross-cultural comparisons to understand better how contextual factors influence the adoption of OPS.

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