Factors Influencing Adoption of Online Payment for Public Services in Vietnam

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Abstract
This research applied the E-government Adoption Model (GAM) of Shareef et al. (2011) to examine the factors affecting the intention to use online payment when using public services in Vietnam. Besides the factors from the GAM model, two new variables "Social influence" and "The display of public services online payment gateways" are added to the model to be suitable for the Vietnam context and give a better explanation of the reasons that affect the factors. The research hypothesis is validated through the questionnaire with a sample of 358 individuals from different provinces. The results of reliability test using Cronbach Alpha and regression analysis on SPSS 26 show that there are 8 independent variables affect the "Behavioral Intention" using the online payment for public services. The variables "Perceived ability to use" and "Perceived Compatibility" are two of the major factors contributing to promoting the decision of individuals to pay for public services online. This research also points out the factor that previous study has not mentioned which is "The display of public services online payment gateways''. However, this research has limited scope in Hanoi and Ho Chi Minh City, the following study can expand the scope to have higher generalization.

Keywords: e-government, e-payment, public services

1. Introduction
The modernization of internet-based services has been aided by advancements in information and communication technologies (ICTs). Public services is one of the areas where these technological advancements have had a big impact. The notion of e-government refers to the use of information and communication technologies (ICTs) to improve the efficiency of government services. Transparency, greater citizen-government involvement, cost savings, improved service quality, and speed are all advantages of e-government over traditional ways.

According to the United Nations' assessment in 2020, Vietnam's e-government ranks 86/193 countries, 23/47 Asia, and 6/11 Southeast Asia. Vietnam aims to rank among the top 50 countries in the world for e-Government and digital government development by 2025, and among the top 30 countries by 2030 according to the United Nations ranking. One of the policies of the Vietnamese Government is e-government associated with online payments. According to Resolution No. 17/NQ-CP dated March 7, 2019 of the Government, the government's goal for the period 2019-2020, with a vision to 2025 is the ratio of online payments on the National Public Service Portal to total the number of payment transactions of public services reached 25% and the rate of administrative procedures requiring financial obligations to be paid online on the National Public Service Portal reached 50%. To achieve this goal, the government and other stakeholders must play a role in raising citizens awareness and offering reliable online payment systems.

To learn more about the factors influencing the online payment of public services in Vietnam, this study expanded the GAM model by including two new variables: social influence and the display of public services online payment gateways, both of which we believe have a significant impact on e-government users' intentions and behaviors.

The research proposes options for e-government platforms and the government to adopt regulations that encourage citizens to adapt online payment for public services – a trend in the 4.0 Industrial Revolution.

2. Literature Review and Theoretical Framework

2.1. Literature Review

E-government Adoption Model (GAM) is one of the most used models to research the use of online public service. GAM factors has been used in different research across many countries. In 2017, Lallmahomeds used GAM model, along with UTAUT model, to investigate the factors that influence e-government adoption in Mauritius through a technology adoption lens. This study found that "Computer self-efficacy'' – a factor in GAM model has a significant negative association with behavior intention. In 2018, GAM model factors were integrated in the model to study the Cloud-based E-Governance services adoption in India (Sivathanu, 2018). The results show that "Perceived Awareness", "Computer self-efficacy'', "Multilingual option" of GAM model present positive relationship with behavioral intention. GAM model was also used to identifying the differing service maturity levels of mobile-based Smart Regency in Indonesia (Darmawan et al, 2020). The study found that the variables in the GAM model reflect a positive relationship and are significant in terms of quality measures for intelligent district services. In details, the GAM factors including "Perceived Compatibility'', ''Availability of resource'', "Computer Self Efficacy", "Perceived Ability to Use", "Multilingual Option", "Perceived Information" all have positive relationship with the adoption of E-governmetn adoption.

Besides that, GAM model was also used to explore the main factors that influence the adoption of smart-government services at the different stages. A study in 2020 investigated the effect of GAM factors at the three main stages of smart-government services which are the static, interaction, and transaction stages (Althunibat et al, 2021). The results demonstrate that "Perceived Compatibility", "Perceived Awareness", "Perceived Ability To Use" and "Perceived Functional Benefit" were the strongest factors for smart government adoption.

Theoretical Framework

The E-government Adoption Model (GAM) developed by Shareef, V.Kumar, U.Kumar and Dwivedi (2011) is a theoretical model used to identify important factors affecting people's adoption e-Government services at different service maturity levels. This model is a combination of technology acceptance model (TAM), Diffusion of Innovation (DOI) and Theory of Planned Behavior (TPB). The E-government Acceptance Model (GAM) was created to overcome various weaknesses in all three previous approaches.

GAM is a comprehensive model that includes thirteen constructs namely: Perceived Awareness (PA), Availability of Resources (AOR), Computer Self-Efficiency (CSE), Perceived Compatibility (PC), Perceived Image (PI), Perceived Ability to Use (PATU), Perceived Information Quality (PIQ), Multilingual Option (MLO), Perceived Functional Benefit (PFB), Perceived Trust (PT) and Perceived Service Respond (PSR).

2.2. Public services and online payment of public services

Public services are services related to law enforcement activities, not for profit, granted by competent state agencies to organizations and individuals in the form of legal papers. Each public service is associated with an administrative procedure to complete a specific job related to an organization or individual.

In the context of industrial revolution 4.0, digital transformation of public services is extremely necessary, contributing to accelerating the process of building e-Government.

Online public service gateway is a website for public administrative services and other services of state agencies provided to organizations and individuals in the Internet environment, allowing individuals and organizations to pay their obligations online.

Online payment is a cashless transaction model that has been popular in the world in recent years with the goal of moving towards the trend of "cashless" in the digital economy era. This is an intermediary service to help customers pay for public services on public service online payment gateway websites; is a connection system between banks, individuals, organizations and the Government with the ultimate goal that individuals and organizations can fulfill their public service payment obligations as soon as online transactions are completed. Popular forms of online payment in Vietnam include payment via card, payment by e-wallet, payment via bank transfer and payment through online payment gateway.

3. Hypothesis development and research model

3.1. Hypothesis development

Perceived Compatibility

Perceived compatibility is defined as the degree to which a new technology meets the habits, values, and needs of the potential adopter (Rogers, 1995). According to Gilbert et al. (2004). This factor is considered to be one of the most important factors in explaining attitude towards use along with the adoption of the system. This construct has been used by several researchers as a significant predictor of e-Gov adoption (Carter & Bélanger, 2004; Chen & Thurmaier, 2005; Shareef et al., 2007). Thus, the present study illustrated below hypothesis:

H1: "Perceived Compatibility" has a positive impact on Behavioral intention of using online payment for public services.

Perceived awareness

Perceived awareness can be conceptualized as having and acquiring knowledge as much as a user perceived to be sufficient to learn the characteristics of an online system and interact through the perception or by means of information about ICT (Shareef et al., 2009). Awareness of the system is important at the beginning to develop beliefs (Limayem, Hirt, & Cheung, 2007) which turns to the attitude of using the system according to the TPB and TRA. In some previous studies, perceived awareness was mentioned as the significant independent variable to create the attitude to use an e-Gov system (Eggers, 2004; Parent et al., 2005). For the above arguments, our research group formally hypothesize that:

H2: "Perceived Awareness" has a positive impact on Behavioral intention of using online payment for public services.

Availability of Resources

E-Government adoption will be unsuccessful unless the digital divide is bridged, equitable resources for using e-Government are promoted, and all components of an e-Government system and knowledge are made available. There is an obvious relation between availability of resources and the adoption of e-Gov (van Dijk et al., 2008). We propose here:

H3: "Availability of Resources" has a positive impact on Behavioral intention of using online payment for public services.

Computer Self-Efficacy

The organizational structure of e-Gov is computer-and internet-based. As a result, it is expected that a user's lack of hands-on experience with technology would not lead to a favorable attitude toward adoption of the system and a user will also be unable to appreciate the economic advantages of e-Gov in the absence of computer skills. Users' computer self-efficacy and experience with the internet, ICT, and computers create a sense of security in their attitude toward using online systems according to several researchers (Moon & Norris, 2005; Tung & Rieck, 2005; van Dijk, Peters, & Ebbers, 2008). We based on this to propose that:

H4: "Computer Self -Efficacy" has a positive impact on Behavioral intention of using online payment for public services.

Perceived Ability to Use

If users are unable to use technology to access useful information and services, e-Government will fail and users eventually do not preceive e-Government as useful. Due to revolutionary reengineering of the traditional government system, Shareef et al. (2010) introduced and argued that perceived ability to use reflects the ability of citizens to use an e-Gov system, which leads to the intention to use ICT and the acceptance of the system. We also propose that:

H5: "Perceived Ability to Use" has a positive impact on Behavioral intention of using online payment for public services.

Multilingual Option

To conduct virtual transactions for people of various ethnic backgrounds, several additional amenities are required. This criterion is especially significant in a country with multiracial and multilingual populations. Several research also considers this factor to be a significant reason for

customers adopt a certain e-commerce platforms (Collier & Bienstock, 2006; Kim et al., 2006; Parasuraman et al., 2005; Wolfinbarger & Gilly, 2003). Given these considerations, the multilingual e-Gov option may help to increase e-Gov adoption. Our group formally develop the following hypothesis:

H6: "Multilingual Option" has a positive impact on Behavioral intention of using online payment for public services.

Perceived Information Quality

Information quality, which includes accuracy, current information, relevancy, fulfillment, linkage, completeness, integration, content, organization, presentation, etc can can influence individuals' willingness to embrace e-Gov services (Collier & Bienstock, 2006; Kim, Kim, & Lennon, 2006; Kumar et al., 2007; Parasuraman, Zeithaml, & Malhotra, 2005; Sebastianelli, Tamimi, & Rajan, 2006). Another the empirical study conducted in Australia (AGIMO, 2003) found that information from government will be provided in accordance to fulfilling citizen needs rather than serving the convenience of government agencies. For the above arguments, our group formally develop the following hypothesis:

H7: "Perceived Information Quality" has a positive impact on Behavioral intention of using online payment for public services.

Perceived Trust

Because transactions in e-Government are essentially virtual, the uncertainty construct can be a potential element in e-virtual Government's environment's non-acceptance. This is related to perceived trust in e-Gov (Al-Adawi et al., 2005). In other research articles, trust is also considered as one of the factors affecting intention of customers to use. The study of Hoda Mashayekhi and Yoosof Mashayekhi (2017) has determined the effect of the factor "Trust" on intention to use online payment is positive. This research thus proposes:

H8: "Perceived Trust" has a positive impact on Behavioral intention of using online payment for public services.

Perceived Functional Benefit

A user can get a variety of relative and absolute benefits by using e-Government services. Shareef et al. (2010) introduced perceived functional benefit (PFB) as the predicted variable of e-Gov adoption. PFB captures the essence of time efficiency, citizens might adopt e-Government systems because they save time performing activities compared to traditional paper-based government offices (Carter & Bélanger, 2005; Gilbert et al., 2004; Wagner, Cheung, Lee, & Ip, 2003). And price savings which is a measure of e-Government efficiency in terms of lower service providing costs, is also an overlapping concept of PFB (Tung & Rieck, 2005). Therefore, we propose:

H9: "Perceived Functional Benefit" has a positive impact on Behavioral intention of using online payment for public services.

Perceived Image

Image refers to citizens' perceptions that adopting e Gov makes them superior to others in the society, proposed by Moore and Benbasat (1991), Shareef (2010). Instead of traditional

government offices, using e-Gov systems reflect the adopters acquaintance with modern technology, higher level of education, competence in using computers and the internet, and perception of modernism, these phenomena may confer some social values and prestige to adopters. Gilbert et al., 2004; Phang et al., 2005; Tung & Rieck, 2005) also included this construct in their proposed model of e-Gov adoption. Thus, our research group formally hypothesize that:

H10: "Perceived Image" has a positive impact on Behavioral intention of using online payment for public services.

Perceived Service Response
Several researchers consider customer service to be one of the most important explanatory variables in ensuring customer satisfaction and, as a result, recurring use of e-Government (Lee & Rao, 2003; Shareef et al., 2007; Wangpipatwong et al., 2005). When there are problems or concerns, if citizens perceive a higher level of customer service in e-Gov than that offered in a traditional government office, they will purse the adoption of e-Gov. Shareef et al. (2009) proposed that service respone has a significant effect on citizens' adoption of e-Gov. Based on the above arguments, we propose here:

H11: "Perceived Service Response" has a positive impact on Behavioral intention of using online payment for public services.

Social Influence
It can be said that the more positive reviews from the reference group are, the higher the attitude toward using the product is. Social influence indicating beliefs of a person whether or not he or she should engage in the behavior under peers and important people evaluation (Ajzen, 1991). In this research, we propose that:

H12: "Social Influence" has a positive impact on Behavioral intention of using online payment for public services.

The display of public services online payment gateways
The consumer's decision to use a system is also based on a personal preference of the system's design. Including colors, layout, fonts, navigation bar, etc., the display of public services online payment gateways may work to motivate users to use e-Gov system. Therefore, the last hypothesis is as follows:

H13: "The display of public services online payment gateways" has a positive impact on Behavioral intention of using online payment for public services.

3.2. Research model
Based on the theoretical framework and summary of previous literature, our research model of factors affecting online payment intention for public services in Vietnam is illustrated in Figure 3. Along with defined factors, thirteen hypotheses were constructed to examine impact of independent variables (perceived compatibility, perceived awareness, availability of resource, computer-self efficacy, perceived ability to use, multilingual option, perceived information quality, perceived trust, perceived functional benefit, perceived image, perceived service

response, social influence, the display of public services online payment gateways) to dependent variable (behavioral intention of using online payment for public services).
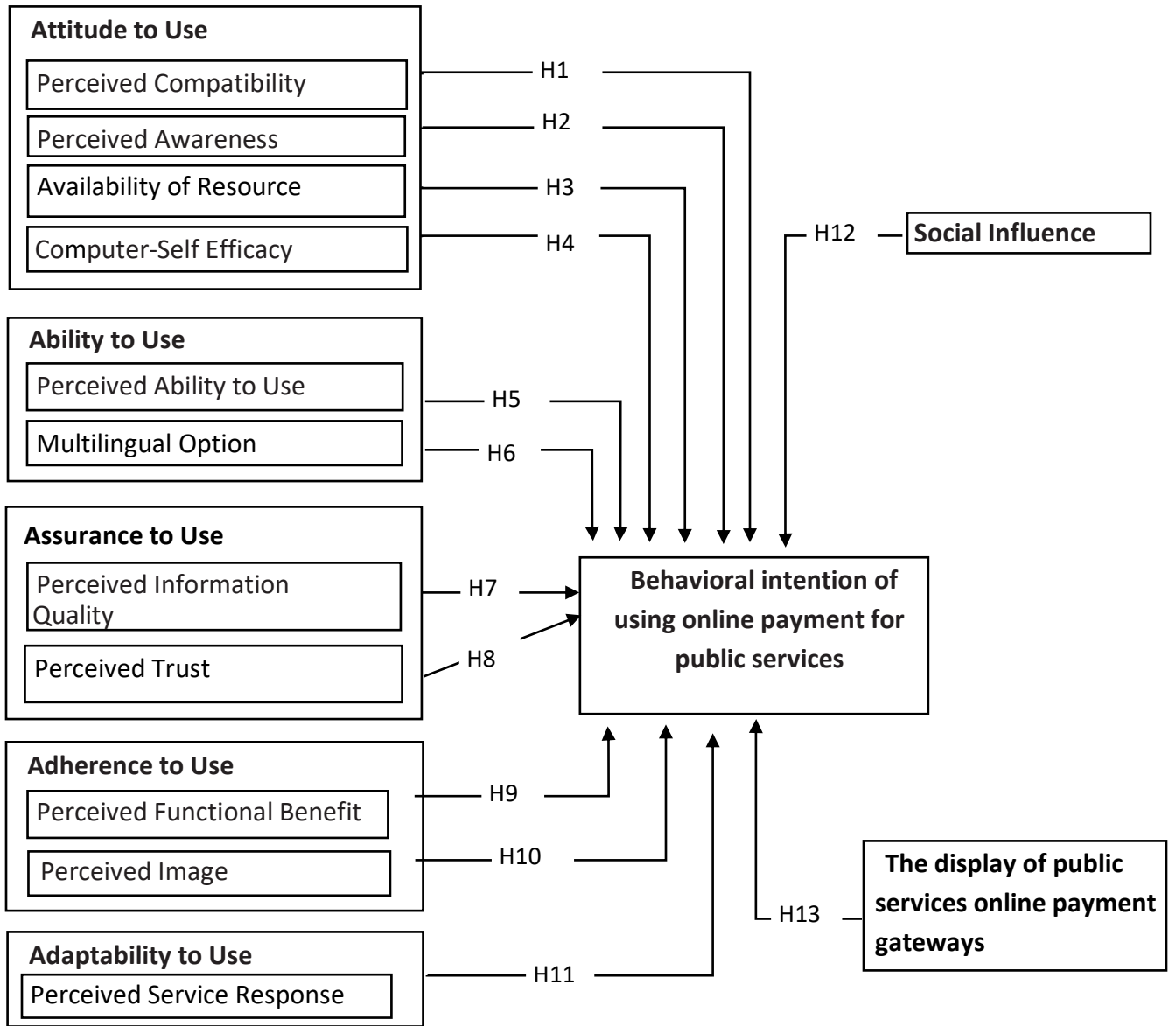

Figure 1: Research model

4. Research Methodology

This study's research method consists of three steps, as follows: A review of the literature on e-government adoption studies was done as the first stage. The data was collected using the quantitative method in the second stage. Finally, we used Cronbach's Alpha, the EFA test, and regression analysis to analyze the data collected from the previous phases.

In this study, a quantitative method was used, based on a questionnaire, to collect and analyze the data. The questionnaire contained 81 questions and 14 variables that had been adapted from a previous research study to ensure content validity. The survey form was sent to the participations in both online and offline way.

The survey was carried out on a national scale with the participants who are public services users. The researchers try to ensure the representativeness of the sample with different characteristics in different areas. The team conducted screening questionnaires, removing invalid forms which miss important information, or more than 10% of information and lack of logic in some answers. Finally, the number of survey forms eligible for data analysis was 358, distributed as follows: Regarding the gender of the participants, 177 people were male - accounting for 49.4. % and 179 people are female - accounting for 50% and the 2 others belong to other gender - accounting for 0.6%. About their age, the distribution into groups is as follows: From 18 to under 22 years old (134 people – 37.4%); From 22 to under 40 years old (177 people – 49.4%); From 40 to under 60 years old (43 people – accounting for 12%) and From 60 years old and above (4 people – accounting for 1.1%). In terms of education level, most of the participations had university/college degrees (50.3%), followed by high school graduates (37.4%) with 134 people, postgraduate subjects (10.3%) with 37 people and the lowest percentage are people with less than high school education (2%).

The final step includes testing the validity of the variables using Cronbach's Alpha and EFA test. The validity test helps the research team to identify the dependent and independent variables to take into the regression analysis. The tests were conducts on SPSS 26.

5. Data Analysis and Research Results

5.1. Measure reliability

By using Cronbach's Alpha, research team tests the liability of 14 potential variables including 13 independent ones with 68 observed variables and 1 dependent factor with 6 observed variables. To be considered reliable, a potential variable must have the value of Cronbach's Alpha coefficient not less than 0.6 (Hoang Trong & Chu Nguyen Mong Ngoc, 2008) and have the value of the corrected item – total correlation of each observed variable not less than 0.3 (Nunnaly, J., 1978). The result shows that all the potential variables meet the requirements of reliability test. The value of Cronbach's Alpha coefficient ranges from 0.727 to 0.863 and the value of the corrected item – total correlation of all items is greater than 0.3. The reliability test result is shown in more detail in Table 1:

Table 1: Reliability analysis results

Factor Code	Factor's name	Number of observed items		Cronbach's Alpha	Corrected Item – Total Correlation minimum
		Before	**After**		
PC	Perceived Compatibility	5	5	0.830	0.616
PA	Perceived Awareness	5	5	0.878	0.684
AOR	Availability of Resource	5	5	0.855	0.617
CSE	Computer-Self Efficacy	8	8	0.851	0.512
PATU	Perceived Ability to Use	6	6	0.872	0.627
MO	Multilingual Option	3	3	0.855	0.650
PIQ	Perceived Information Quality	8	8	0.838	0.562
PT	Perceived Trust	5	5	0.846	0.637
PI	Perceived Image	3	3	0.830	0.679
PFT	Perceived Functional Benefit	7	7	0.856	0.561
PSR	Perceived Service Response	5	5	0.857	0.658
SI	Social Influence	4	4	0.857	0.648
DOOPG	The display of public services online payment gateways	4	4	0.827	0.648
ITU	Intention	6	6	0.861	0.530

(Source: Quantitative research results)

5.2. Measure validity

After performing the reliability analysis, the team conducted the exploratory factor analysis (EFA) by using Principle Components Extraction method with Varimax rotation. The team run EFA for the independent variables first. The result shows that KMO test = 0.788 (0.5<0.788<1), Barlett's test = 11197.065 with Sig. = 0.000 <0.05. There are 13 factors with Eigenvalue values >1. The loading factor of all items are greater than 0.5 so no items were rejected. Next, the EFA test is conducted for the dependent variables, which is intention to use. KMO test = 0.849 (0.5<0.849<1), Barlett's test = 959.354 with Sig. = 0.000, Eigenvalue value $\geq$ 1 and loading factor of all observed >0.5. From these tests, we have 13 independent variables and 1 dependent variables for the Regression analysis.

5.3. Hypothesis Testing

After conducting exploratory factor analyses, the research team discovered 14 variables that serve the running of regression models instead of the potential variables that were initially assumed. Perceived Compatibility (PC), Perceived Trust (PT), Perceived Information Quality (PIQ), Perceived Awareness (PA), Availability of Resource (AOR), Computer-Self Efficacy (CSE), Multilingual Option (MO), Perceived Ability to Use (PATU), Perceived Service Response (PSR), Perceived Functional Benefit (PFB), Perceived Image (PI), Social Influence (SI), The display of public services online payment gateways (DOOPG) are independent variables and Intention to use (IN) is the dependent one. The team planned to run the regression model, which looks at the effects of 13 independent factors on the Intention to Use (IN). As a result, the coefficient of R^2 is 0.647 indicates that the built regression model is consistent with the data set at 64.7%, there is no collinearity phenomenon between variables due to the fact that VIFs are below 2, F-test has a low Sig. value (= 0.000b). Results of specific regression models are indicated in Table 2.

Table 2: Regression results

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance (1/VIF)	VIF
1	Constant	-1.679	.324		-5.182	.000		
	PC	.096	.033	.102	2.940	.004	.861	1.161
	PA	-.003	.027	-.003	-.103	.918	.909	1.100
	AOR	.010	.030	.011	.342	.733	.938	1.066
	CSE	.116	.036	.110	3.187	.002	.855	1.169
	PATU	.326	.037	.329	8.928	.000	.757	1.321
	MO	.191	.029	.234	6.630	.000	.823	1.215
	PIQ	.224	.037	.217	6.130	.000	.818	1.222
	PT	.244	.033	.267	7.404	.000	.789	1.268
	PFB	.073	.034	.072	2.168	.031	.935	1.070
	PI	.032	.029	.039	1.116	.265	.841	1.189
	PSR	-.005	.029	-.006	-.187	.852	.921	1.085
	SI	.044	.027	.053	1.605	.109	.927	1.079
	DOOPG	.079	.028	.092	2.792	.006	.948	1.055

(Source: Quantitative research results)

The research group obtained the regression models that analyze the impact of independent variables on dependent variables as follows:

IN = 0.102*PC + 0.110*CSE + 0.329*PATU + 0.234*MO + 0.217*PIQ + 0.267*PT + 0.072*PFB + 0.092*DOOPG
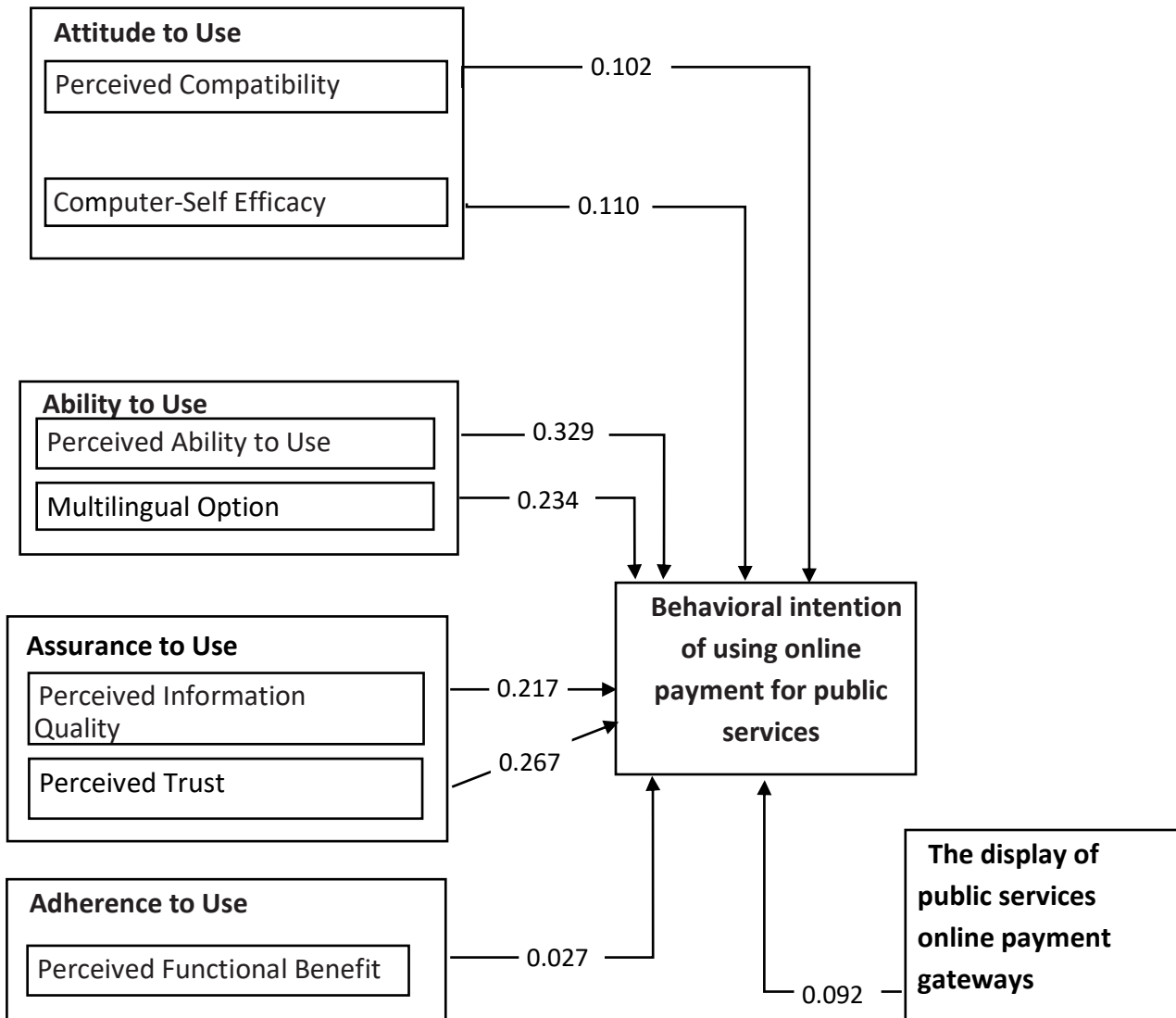
Figure 2. Research result

With the significance level of 5%, 8 out of 13 independent variables in the two models are significant, except the variable Perceived Awareness (PA), Availability of Resource (AOR), Perceived Image (PI), Perceived Service Response (PSR), Social Influence (SI) with its Sig. exceeds 0.05. In the model, Perceived Compatibility (PC), Perceived Trust (PT), Perceived Information Quality (PIQ), Computer-Self Efficacy (CSE), Multilingual Option (MO), Perceived Ability to Use (PATU), Perceived Functional Benefit (PFB), The display of public services online payment gateways (DOOPG) all have positive effects on the Intention to use (IN). In particular, Perceived Ability to Use is considered to have the strongest impact (β=0.326). This is followed by Perceived Compatibility, Perceived Information Quality.

6. Findings

Based on the UTAUT (Venkatesh et al., 2003) and GAM model (Shareef et al., 2011), the paper developed, measured, and evaluated which factors affect the intention to use an online payment system for public services. The theoretical framework of relationships between thirteen independent constructs, including Perceived Compatibility (PC), Perceived Awareness (PA), Availability of Resource (AOR), Computer-Self Efficacy (CSE), Perceived Ability to Use (PATU), Multilingual Option (MO), Perceived Information Quality (PIQ), Perceived Trust (PT), Perceived Functional Benefit (PFB), Perceived Image (PI), Perceived Service Response (PSR), and two newly introduced variables Social Influence (SI) and The display of public services online payment gateways (DOOPG). Results revealed that all influence Behavioral intention (IN) of using online payment for public services, among them are the two most powerful variables PATU and PC. Thus, Perceived Ability to Use (PATU) is a characteristic factor affecting consumers' choice of online payment for public services. This implies that when consumers paying public services fee if they are able to use technology to access useful information and services, they will have the intention of using online payment.

Our research shows that PC, CSE, PATU, MO and PT together share positive relationships with the Behavioral intention (IN) which are similar to the results of Darmawan et al. (2020) and Althunibat et al. (2021). Moreover, Althunibat et al. (2021) also found that PATU is one of the most influential factors. The results show that citizens are more likely to start and continue using services if they are aware of the benefits of utilizing new technology, can interact with government representatives, and perceive the relative advantages of the applications. Contrary to previous research, when Althunibat et al. (2021) argued that PT and MO do not have a significant effect, our results indicated that PT and MO have a positive impact on Behavioral intention of using online payment for public services. One of the reasons is due to the research sample, which is distinct from the behavior of people in Vietnam and Jordan. On the other hand, although unable to recognize the relationship between SI and IN, the authors discovered that a newly introduced variable DOOPG was confirmed to be a decisive determinant in explaining IN. Factors such as PIQ and DOOPG may explain the positive relationship with behavioural intention. For instance, citizens may be able to adopt eGov services if the website is not too complicated to use, right design principles were used and the information provided is up-to date. This in turn can lead to change.

Overall, this study shows a solid significance on determinants that influence online payment intention for public services in Vietnam. The findings should be recommended for adopting better use of online payment systems for public services. Some of the recommendations are illustrated below:

(1) Upgrade IT infrastructure and concentrate on improving e-Gov systems and fulfilling citizens' needs separately

(2) Pay particular attention and work on the ancillary factors that will improve citizens' technological and psychological abilities to use online government services

(3) Build a clear and appropriate legal environment, also develop new policies if necessary, in order to bring convenience as well as create confidence and motivation for citizens when providing information and paying online for public services

7. Limitations and Further Research

Due to time and cost constraints, this study was conducted with the main scope in Hanoi and Ho Chi Minh City - two major cities of Vietnam. This leads to the results and conclusions of the study are not guaranteed to be highly accurate. Therefore, the following studies need to expand the research scope to many other places and samples to have higher generalizability.

This study points out several factors that affect the intention to pay online for public services. Besides, there are many other factors that have an impact on behavioral intention of using online payment for public services that the study has not mentioned. The future studies should add some exogenous variables and could separately explore the adoption criteria of business organizations for different levels of service maturity.

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