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ADIEU TO CASH: A TRANSITION IN VIETNAM UNDER COVID-19 PANDEMIC, EVIDENCES FROM E-COMMERCE PLATFORMS

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Abstract

The global COVID-19 pandemic has negatively affected the world economy, including Vietnam, yet the crisis has also levered the increase in the cashless payment rate, thereby giving rise to new consumer behaviour. The study aims to develop an integrated model of the Unified Theory of Acceptance and Use of Technology (UTAUT) and Protection Motivation Theory (PMT) to examine factors affecting Vietnamese customers' intention to use cashless payment services on E-commerce platforms during the COVID-19 pandemic. Based on data from a survey of 183 samples, the proposed conceptual model was empirically validated by applying the Covariance-Based Structural Equation Modeling (CB-SEM) and bootstrapping techniques. Findings revealed that Vietnamese customers' *intention to use* cashless payment on E-commerce platforms during the COVID-19 pandemic is positively influenced, either directly or indirectly, by *performance expectancy*, *effort expectancy, social influence*, *perceived security and privacy,* and *response efficacy*, while *self-efficacy* and *perceived severity* were proved to be not significant enough. It can also be seen that *social influence* and *self-efficacy* have a direct positive effect on *effort expectancy*, and *effort expectancy* mediates their effects on *performance expectancy,* while *response efficacy* is directly associated with *performance expectancy.*

Keywords: cashless payment, COVID-19, intention to use, e-commerce, UTAUT-PMT Approach

Introduction

In December 2019, a pneumonia outbreak of unknown aetiology was detected in Wuhan (Hubei, China), of which the cause was later identified to be a novel coronavirus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (World Health Organization, 2020). Many countries and territories worldwide have recorded infected cases and deaths. According to Vietnam Briefing (2021), since the first case was detected on 21 January 2020, Vietnam has declared 8,747 coronavirus infected cases with 53 deaths, of which 3,368 patients have recovered and been discharged from the hospital by 7 June 2021. On 29 May 2021, the Ministry of Health announced the detection of a coronavirus hybrid variant with characteristics similar to the B.1.617.2 strain found in India and the B.1.1.7 strain from the United Kingdom (UK). The UK variant is believed to be more transmissible than the original strains, yet the newly detected mutation is even "faster, stronger, more dangerous, more unpredictable and harder to control", stated Prime Minister Pham Minh Chinh in the Government's regular session in May 2021 (Vietnam Briefing, 2021).

When the COVID-19 epidemic flared up, social distancing policy encouraged by the World Health Organization (WHO) triggered consumers to shift to contactless activities, including payment transactions. Authorities in an increasing number of countries are taking action to buoy up contactless payments as the effect of COVID-19 escalates. Recently, on 26 May 2020, the Prime Minister issued Directive No. 22/CT-TTg to promote the development of E-commerce and payment centres, specifically in the context of the alarming effects of the global COVID-19 epidemic.

In fact, *a certain number of researchers examined the intention to use cashless payment*, yet not many studies, especially in Vietnam, have been conducted considering the context of the COVID-19 pandemic. The development of cashless payment has been emphasised since 2016 following the approval of the five-year Scheme on developing cashless payment; however, it was not until COVID-19 hit the economy and triggered the growth of E-commerce that the demand for a safer and more compatible payment method was fostered. Therefore, it is necessary to study this change to draw the most precise conclusion and orientation for future development.

Literature Review

Cashless payment for E-commerce

The idea of E-commerce (Electronic Commerce) first came into sight in the 1970s in the transactions between businesses by EDI (Electronic Data Interchange) via

VAN (Value-Added Networks); however, it was not until the emergence of the internet that E-commerce started to be developed at high speed. Payment is one of the most complicated but essential problems, as only when the whole process is executed "electronically" can it be called E-commerce. The cashless payment system is the electronic version of the traditional one with cash, cheques, and credit cards; however, the application of technology and electronic means allows transactions and mediums of transaction to be digitalised and virtualised by bit strings, enforcing the buying and selling activities on the Internet. In addition, while only banks have the right to issue money and valuable papers in the traditional system, financial companies are also allowed to develop software as payment tools in a cashless payment system.

Models

Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT model was introduced by Venkatesh, Morris, Davis, and Davis (2003) based on eight previous theories, including (1) Theory of Reasoned Action (TRA), (2) Technology Acceptance Model (TAM), (3) Motivational Model (MM), (4) Theory of Planned Behavior, (5) Combined TAM and TPB (C-TAM-TPB), (6) Model of Personal Computer Utilisation (MPCU), (7) Integration of Innovation Diffusion Theory (IDT), and (8) Social Cognitive Theory (SCT). In this model, *performance expectancy, effort expectancy,* and *social influence* determine the decision to use a technological product. The model also added a new factor named *facilitating conditions* and moderators such as *gender, age, experience* and *voluntariness of use.*

Protection Motivation Theory (PMT)

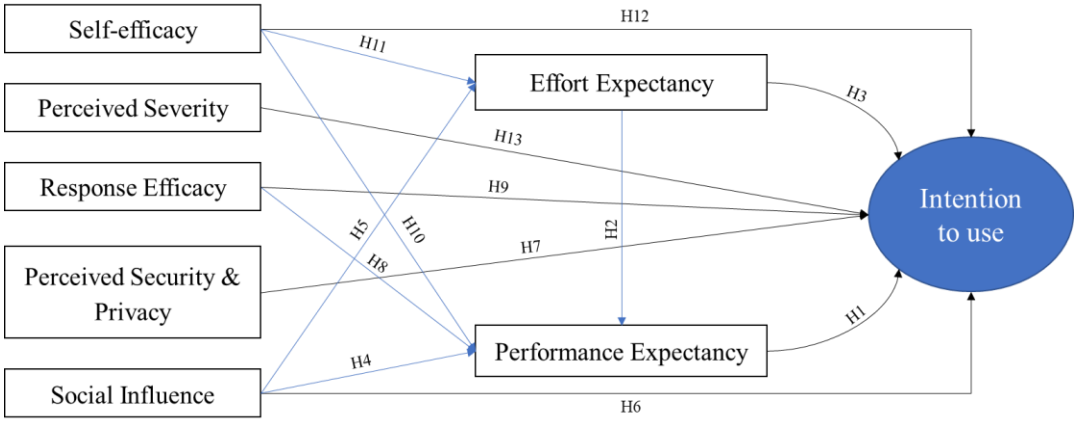
PMT was first introduced by Rogers (1975) to answer the question of whether fear appeals can directly or indirectly influence attitudes and behaviours. Rogers (1983) later extended the revised theory, providing a more comprehensive range of factors that trigger cognitive processes. The theory involves two dimensions, including *threat appraisal* (comprising *perceived vulnerability* and *perceived severity)* and *coping appraisal* (encompassing *self-efficacy* and *response efficacy*). PMT can be applied to any threat for which an individual can conduct an effective recommended response (Floyd, Prentice-Dunn, & Rogers, 2000), including cyberbullying (Doane, Boothe, Pearson, & Kelley, 2016), protective technologies (Chenoweth, Minch, & Gattiker, 2009), protective payment solutions (Srivastava, Goli, & Vandana, 2021), to name but a few.

Framework and Hypotheses

Framework

This study revises UTAUT and PMT, with the suggested model including 8 factors, in which *intention to use* (IU) cashless payment service in E-commerce platforms during COVID-19 pandemic is the dependent variable. Independent variables consist of *performance expectancy* (PE), *effort expectancy* (EE), *social influence* (SI), *perceived security and privacy* (SP), *self-efficacy* (SE), *perceived severity* (PS), and *response efficacy* (RE). The model with connection is shown in Figure 1.

Figure 1: Research model



(Source: Proposed by the authors.)

Hypotheses

In the first publication of the Theory of Planned Behavior (TPB), Ajzen (1985, p. 29) mentioned the concept of *intention* from the viewpoint that it is expected only to predict a person's attempt to perform a behaviour, not necessarily the actual performance. However, when the theory was revised in 1991, Ajzen assumed *intention* could capture the motivational factors that drive the behaviour. Specifically, *intention* indicates people's willingness to try and how much effort they are planning to devote to performing the behaviour (Ajzen, 1991).

Performance Expectancy (PE) is the degree to which a person believes in the gains in job performance that he or she can achieve by using the system (Venkatesh et al., 2003, p.447). Numerous studies have pointed out the significant positive impact of PE on customers' intention to adopt information technology (Benbasat & Barki, 2007; Carter, Shaupp, Hobbs, & Campbell, 2011; Phan, Tran, Hoang, & Dang, 2020).

H1: *Performance expectancy (PE) positively impacts intention to use (IU).*

Similarly, ***effort expectancy*** (EE) was first introduced in the UTAUT model, which refers to the ease of using the system (Venkatesh et al., 2003, p.450). As one of the core determinants in the UTAUT model, EE is considered a significant driver of new technology adoption in different areas (Chang, Hwang, Hung, & Li, 2007; Schaper & Pervan, 2007; Gupta, Dasguptab, & Gupta, 2008). Davis (1989) also suggested that EE positively influences utilitarian PE, which was later confirmed by numerous researchers (Sung, Jeong, Jeong, & Shin, 2015; Fedorko, Bačik, & Gavurova, 2021).

H2: *Effort expectancy (EE) positively impacts performance expectancy (PE).*

H3: *Effort expectancy (EE) positively impacts intention to use (IU).*

Venkatesh et al. (2003) introduced ***social influence*** (SI) into the UTAUT model, in which it was defined as the degree of an individual's perception regarding how important others believe he or she should use the system (Venkatesh et al., 2003). Many researchers agreed on the positive influence of SI on the intention to use, to which an individual is, to some extent, moved by others' opinions when making the decision (Al-Saedi, Al-Emran, Ramayah, & Abusham, 2020; Jung, Kwon, & Kim, 2020). In addition, Fedorko et al. (2021) discovered a positively significant link between SI and expected performance, while Sung et al. (2015) confirmed the positive impact of SI on both EE and PE.

H4: *Social influence (SI) positively impacts performance expectancy (PE).*

H5: *Social influence (SI) positively impacts effort expectancy (EE).*

H6: *Social influence (SI) positively impacts intention to use (IU).*

Perceived security and privacy (SP) can refer to users' belief in the system regarding its ability to conduct their transactions safely and soundly while the privacy of their personal information is also well-protected (Chellappa, 2007). Kim, Tao, Shin, and Kim (2010) found that perceived security positively and significantly impacts the intention to use.

H7: *Perceived security & privacy (SP) positively impacts intention to use (IU).*

Response efficacy (RE) measures the belief in the recommended behaviours' capacity to reduce or eliminate the danger (Prentice-Dunn & Rogers, 1986). Many previous studies found that RE predicts changes in a person's intention to engage in protective health behaviours (Rogers & Mewborn, 1976; Shelton & Rogers, 1981; Maddux & Rogers, 1983). In addition, it can also be inferred that the stronger the belief in the ability of protection, the higher the expectation of the gains from the behaviour.

H8: *Response efficacy (RE) positively impacts performance expectancy (PE).*

H9: *Response efficacy (RE) positively impacts intention to use (IU).*

Self-efficacy (SE) can be interpreted as an individual's confidence level in his or her ability to accomplish a task (Dory et al., 2008). Many studies confirmed that SE significantly positively impacts perception and behavioural intention to use an information system (Hill, Smith, & Mann, 1986; Luarn & Lin, 2005). In addition, Venkatesh and Davis (1996) found a strong link between SE and *ease of use perception*, which might refer to *effort expectancy* (EE) in this context. The findings of Sung et al. (2015) revealed that SE is also positively associated with PE.

H10: *Self-efficacy (SE) positively impacts performance expectancy (PE).*

H11: *Self-efficacy (SE) positively impacts effort expectancy (EE).*

H12: *Self-efficacy (SE) positively impacts intention to use (IU).*

Perceived Severity (PS) can be explained as a person's opinion regarding the seriousness of a health threat (Rosenstock, 1974). According to prior researchers, the higher the level a person perceives the severity, the more likely he or she will be motivated to perform the recommended protective behaviours (Prentice-Dunn & Rogers, 1986; Floyd et al., 2000).

H13: *Self-efficacy (SE) positively impacts intention to use (IU).*

Data Gathering and Analysis

Convenience sampling was used to distribute a five-point Likert survey on Google Forms via Facebook and Zalo, collecting 183 valid observations. Participants were asked to answer some demographic information and rate the variables on a scale

from 1 to 5 (equivalent to 1 - Totally disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, 5 - Totally agree). According to Bentler and Chou (1987), in CB-SEM analysis, the ratio between the sample size and the number of observed variables should be at least 5:1. In this paper, 183 valid observations were collected for a model of 8 factors with 31 observed variables, qualified with the ratio of 5.9:1.

Table 1: Demographic description of observations

Rating criterion	Rating indicator	Quantity	Percentage
Gender	Male	53	28.96%
	Female	130	71.04%
	Total	**183**	**100.00%**
Age	Under 18 years old	7	3.83%
	18 - 22 years old	77	42.08%
	23 - 30 years old	42	22.95%
	Above 30 years old	56	30.60%
	Total	**183**	**100.00%**
Occupancy	Student	82	44.81%
	Civil servant	53	28.96%
	Worker in private sector	31	16.94%
	Freelancer	11	6.01%
	Others	6	3.28%
	Total	**183**	**100.00%**
Monthly income	Under 2 million VND	48	26.23%
	2 - 5 million VND	37	20.22%
	5 - 10 million VND	38	20.77%
	10 - 20 million VND	41	22.40%
	Above 20 million VND	19	10.38%
	Total	**183**	**100.00%**
Experience to use cashless payment	Never used	11	6.01%
	Under 1 month	9	4.92%
	1 - 3 months	11	6.01%
	3 months - 1 year	27	14.75%
	Above 1 year	125	68.31%
	Total	**183**	**100.00%**

Frequently used payment method for online shopping	Cash	106	57.92%
	E-wallet	113	61.75%
	Domestic ATM card	97	53.01%
	International card (VISA, Mastercard, etc.)	60	32.79%
	Others	3	1.64%

To sum up, the males comprise 28.96% of the sample, while the female counterparts are 71.04%, most of whom are above 18 years old (96.17%). The survey reached a wide range of observations in various demographic backgrounds (Table1): 44.81% are students, and 51.91% are working, with monthly average income being distributed equally in low-medium groups, while 10.38% of the responses said they earned more than 20 million VND per month. The sample also considered using all major payment methods for online shopping in Vietnam, either cash-based or non-cash tools (including cash, E-wallet, domestic ATM card or international card). Though the majority of the respondents are experienced in using cashless payment in E-commerce platforms (68.31% have been using for more than a year), the survey also approached the inexperience people, with about 10% saying that they had never used the service before or just started to try it recently; hence the research outcome can be useful to examine the intention to either initiate or continue to use the service.

Research data was analysed with Cronbach's Alpha analysis, Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), CB-SEM and bootstrap analysis. The authors have used IBM SPSS Statistics version 26.0 and IBM SPSS Amos version 24.0 for the statistical analysis.

Findings

The data is suitable for factor analysis based on several tests such as Kaiser-Mayer-Olkin (KMO) and Bartlett's Test Sphericity. The test result by IBM SPSS Statistics 26.0 shows that KMO Measure is $0.908 > 0.6$, exceeding the rule of thumb, and the Total Variance Explained is $65.052\% > 50\%$, proving that factor analysis is useful with the data. It can also be seen that the variables are related, according to the small significant level ($sig = 0.000 < 0.05$).

Hair Jr., Anderson, Black, and Tatham (1998) suggested that with the sample size ranging from 150 to 200, the factor loading cutoff is 0.45 for practical significance. It can be seen that the factor loading of all the observed variables is greater than 0.4, thereby acceptable (Hair Jr., Black, Babin, & Anderson, 2009). Eight factors were extracted corresponding to the suggested model, in which

behavioural intention to use (IU) cashless payment method in E-commerce platforms during the COVID-19 pandemic is influenced by 7 driving factors.

Table 2: Summary of factor loadings, Cronbach's Alpha, CR, AVE, MSV

	Factor							
	SE	**PE**	**RE**	**PS**	**SP**	**EE**	**IU**	**SI**
SE1	0.982							
SE2	0.852							
SE3	0.819							
SE4	0.583							
PE4		0.848						
PE5		0.802						
PE1		0.722						
PE2		0.714						
PE3		0.465						
RE3			0.882					
RE2			0.837					
RE4			0.710					
RE1			0.622					
PS3				0.890				
PS4				0.750				
PS1				0.711				
PS2				0.709				
SP3					0.779			
SP2					0.761			
SP1					0.748			
SP4					0.735			
EE2						0.726		
EE3						0.663		
EE4						0.590		
EE1						0.562		
IU2							0.981	
IU1							0.761	
IU3							0.761	
SI2								0.901
SI1								0.728
SI3								0.548
Alpha	**0.898**	**0.831**	**0.891**	**0.883**	**0.848**	**0.788**	**0.883**	**0.759**
CR	**0.902**	**0.839**	**0.893**	**0.896**	**0.854**	**0.792**	**0.890**	**0.777**
AVE	**0.698**	**0.519**	**0.675**	**0.683**	**0.598**	**0.504**	**0.729**	**0.542**
MSV	**0.418**	**0.474**	**0.519**	**0.519**	**0.284**	**0.474**	**0.489**	**0.245**

Source: Results from IBM SPSS Statistics 26.0 and IBM SPSS Amos 24.

CFA results should demonstrate convergent validity and reliability to ensure the result is not deviated. According to Fornell & Larcker (1981), the Average Variance Extracted (AVE) and Composite Reliability (CR), if they exceed the threshold of 0.5 and 0.7, respectively, will be adequate to confirm the convergent validity of all the indicators. In addition, the standardised estimates of all the variables must be above 0.5 to be statistically significant (Hair et al., 2009). The CFA result shown in Table 2 confirmed that all the factors in this model have AVE and CR above the cutoff level, and the estimates exceed 0.5, proving the convergent validity and reliability. Furthermore, the discriminant validity will be satisfied if the square root of each factor's AVE is greater than every correlation between each construct pair, and the Maximum Shared Variance (MSV) must be less than AVE (Fornell & Larcker, 1981). The results in Table 2 and Table 3 have proved the fulfilment of all these requirements.

Table 3: Square root of AVE and correlation

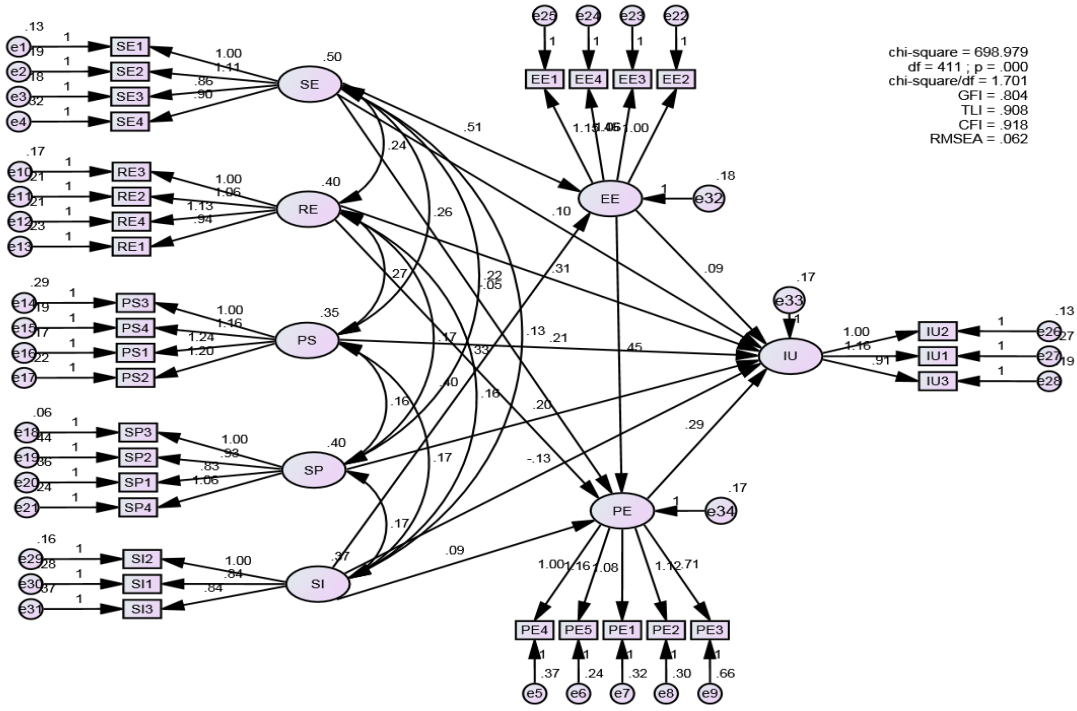
	SE	**PE**	**RE**	**PS**	**SP**	**EE**	**IU**	**SI**
SE	**0.835**							
PE	0.458	**0.720**						
RE	0.524	0.606	**0.822**					
PS	0.619	0.581	0.72	**0.826**				
SP	0.471	0.423	0.411	0.424	**0.774**			
EE	0.646	0.689	0.596	0.614	0.533	**0.71**		
IU	0.591	0.658	0.699	0.669	0.524	0.638	**0.854**	
SI	0.294	0.43	0.373	0.448	0.407	0.495	0.343	**0.736**

Note:
(1) Square Root of AVE is the bolded value lying on the diagonal of the matrix.
(2) The rest is the correlation between each pair of factors.

Source: Results from IBM SPSS Amos 24.

According to Hu and Bentler (1999), the cutoff criteria of an estimated model include RMSEA < 0.08, CFI > 0.80, GFI > 0.90, Chi-square/df < 5, and TLI > 0.90. However, the CFI index depends greatly on the number of scales, variables, and sample size; thus, with limited observations, a model with GFI > 0.80 is acceptable (Doll, Xia, & Torkzadeh, 1994). The research model has been put in SEM analysis with 411 degrees of freedom, Chi-square = 698.979 and $p < 0.05$; RMSEA = 0.062, GFI = 0.825, TLI = 0.908, CFI = 0.918, Chi-square/df = 1.701, which are all qualified.

Figure 2: Structural Equation Modeling (SEM) result



Source: Results from IBM SPSS Amos 24.

CB-SEM tested direct effects, while indirect effects were examined using bootstrapping techniques, with the number of bootstrap samples being set to 5000 times as suggested by Hair et al. (2009). The summarised results are shown in Table 4.

Table 4: Summary of hypothesis testing

Hypothesis		**Direct Effect**		**Indirect Effect**		**Conclusion**
		sig.	Standardised Estimate	sig.	Standardised Estimate	
H1	IU ← PE	0.008	0.254	...	x	supported
H2	PE ← EE	***	0.491	...	x	supported
H3	IU ← EE	0.445	x	0.017	0.125	supported
H4	PE ← SI	0.337	x	0.006	0.183	supported
H5	EE ← SI	***	0.373	…	x	supported

H6	IU ← SI	0.207	x	0.040	0.103	supported
H7	IU ← SP	0.012	0.181	...	x	supported
H8	PE ← RE	***	0.343	...	x	supported
H9	IU ← RE	0.084	0.343	0.017	0.087	supported
H10	PE ← SE	0.591	x	0.005	0.272	supported
H11	EE ← SE	***	0.555	...	x	supported
H12	IU ← SE	0.301	x	0.156	x	rejected
H13	IU ← PS	0.084	x	...	x	rejected

(Source: Results from IBM SPSS Amos 24.)

Discussions

The coefficient of determination (R^2) of IU factor is 0.644, which means that the model has managed to explain 64.4% of the change in the *intention to use*. The figures for EE and PE are 56.7% and 53.3%, respectively.

Findings have confirmed PE's positive significant direct association with Vietnamese customers' intention to use cashless payment on E-commerce platforms during COVID-19. In order to attract customers, it is obvious that the system must be able to provide preeminent services compared to other mechanisms. In addition, the results also validated the effects of EE, RI, SI and SE on PE, evidencing that the perceived functional utility is significantly determined by the simplicity which corresponds to the previous research findings (Davis, 1989; Pietro et al., 2015; Zhao & Bacao, 2021), people seem to expect better performance if the service is initially recommended by their important others (Fedorko et al., 2021), and the higher level of capabilities to execute the use of the system the users believe in themselves, the higher expectation they will put on its performance (Ozturk, 2016).

Research outcomes negated the direct influence yet confirmed an indirect effect of EE on IU, with PE acting as a mediator. In general, for such new technology as cashless payment, whether it can be accepted depends greatly on how long it takes users to use, how difficult it is for the customers to get used to the interface, how much effort it requires to manipulate, etc. The research also figured out a positive direct relationship between EE and SI, which is consistent with the findings of Sung et al. (2015) and Fedorko et al. (2021), asserting that the recommendation of important others can make customers feel the ease of use of the system, and the positive direct impact of SE on EE reaffirming the conclusion

of Davis (1986) that the greater self - confidence in one's ability, the less effort required to use the system he or she might think.

In terms of a direct causal relationship between far-left latent variables and IU, RE is the strongest direct predictor ($\beta = 0.343$) of Vietnamese customers' intention to use cashless payment on E-commerce platforms during COVID-19. Bootstrap analysis also reported the indirect association of RE with intention to use, mediated by PE, yet this effect is less significant. It can be concluded that Vietnamese customers are more intent on using cashless payment for online shopping when they believe that the service can help them avoid threats of virus transmission by minimising physical contact.

Perception of the system's security and privacy enhances the intention to use, which is consistent with many prior research results (Zhao & Bacao, 2021; Salisbury et al., 2001). This can be explained by the fact that internet users hesitate to divulge their private and sensitive information online, and they will refuse to perform any transaction until they find certain trust in the security levels, according to Warrington et al. (2000). The safer the consumers can feel from the cashless payment system, the more intent they will adopt the service, making it essential for the providers to strengthen their ability of security and privacy protection.

Interestingly, SI did not directly impact Vietnamese customers' intention to use cashless payment on E-commerce platforms during COVID-19. It is argued that social impacts weigh more in the decision of inexperienced users (Karahanna et al., 1999), and the voluntary use based on one's own beliefs rather than the opinion of other people also overshadows the impact of this factor (Morris & Venkatesh, 2000). Reviewing the survey response, 93.99% of the observations admitted that they had used cashless payment before, and thus, they are more likely to place reliance on their perception of the service's characteristics and awareness of the pandemic, making SI less significant to intention to use. However, hypothesis H6 is still supported as the result also revealed a small positive indirect influence of SI on intention to use through the mediating role of EE and PE, indicating that people are relying on the views of their important others to perceive the usefulness and ease of use of the service.

Though believed to be the most powerful predictor of behavioural intention (Maddux & Rogers, 1983), SE showed no significant effect on Vietnamese customers' intention to use cashless payment on E-commerce platforms during COVID-19. Instead, it was proved to act as an antecedent to EE, thereby indirectly affecting PE. It is coherent as the greater confidence users feel about their capability, the less effort they expect to use the system; hence, they expect more satisfactory outcomes.

No significant correlation was found between PS and Vietnamese customers' intention to use cashless payment on E-commerce platforms during COVID-19. The mean value of PS factor is the highest among variables (4.086 on a scale of 5), indicating that people are fully aware of the seriousness caused by the disease, yet the awareness of the threats is not enough to affect the use intention.

Conclusion and Recommendations

To sum up, the research has succeeded in proposing an integrated model of UTAUT and PMT to empirically investigate the underlying factors that possibly influence Vietnamese customers' intention to use cashless payment for E-commerce during the COVID-19 pandemic and examine the reciprocal relationship among those factors.

It is, *per se*, a mirror with two sides for E-commerce platforms to promote cashless payment. On the one hand, they can boost payment flows and facilitate customers, as model outcomes suggested, but on the other hand, merchants may find it not discouraging. In Vietnam, merchants are especially acquainted with cash payment without having to leave traces for tax authorities, and this 'advantage' would no longer be feasible if cashless payments were introduced. That is why not all E-commerce platform operators are eager with the idea of cashless facilitation.

However, along with the change in payment convention and the impact of the pandemic, they will have to adapt, and there are steps they can take to reach the cashless target, including closer ties with E-wallet providers, which is an extremely strong trend in Vietnam at the time, or add more security to payment processes, such as SSL certificate, since perceived security is one of the main concern of E-commerce platform users.

Although having arrived at an important conclusion, this research still has certain limitations. Firstly, the respondents of the survey were mainly based in Hanoi with small sample size and failed to reach people from rural areas where the level of literacy, mobile penetration and self-efficacy towards technology use is much lower; hence, the result may be irrelevant and inaccurate if applied in other regions due to the different characteristics.

Future studies should be conducted with larger sample sizes, extended survey objects and more homogenous demographic factors, as well as attempting to reach rural areas where the information technology system is less developed. Future research can include other factors such as personal innovativeness, lifestyle compatibility, hedonic motivation, etc. and/or examine moderating effects of

demographic elements. Furthermore, as the novel coronavirus is expected to be controlled by 2022, thanks to the emergence of vaccines, the paper suggests studying the intention to continue using cashless payments in e-commerce and other industries in the post-pandemic era.

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Appendix 1: Official questionnaires

Factor	Variable	
Intention to use (IU)	IU1	I usually used cashless payments in e-commerce platforms during the COVID-19 era.
	IU2	I will continue using cashless payments in e-commerce platforms during COVID-19.
	IU3	I will use cashless payments more in e-commerce platforms during the COVID-19 era.
Performance Expectancy (PE)	PE1	Cashless payment helps save time when shopping online.
	PE2	Cashless payments make it easier to process payments on e-commerce platforms.
	PE3	Cashless payment helps improve consumer's decisions when shopping on E-commerce platforms.
	PE4	Cashless payments help process a large volume of transactions on e-commerce platforms.
	PE5	Cashless payment satisfies shopping needs anywhere at any time.
Effort Expectancy (EE)	EE1	Cashless payment features in E-commerce platforms are simple and easy to use.
	EE2	It is easy to link/register e-wallets and payment cards on e-commerce platforms.
	EE3	Design of cashless payment features in E-commerce platforms is convenient.
	EE4	Terms and conditions for using cashless payment features in E-commerce platforms are clear and understandable.
Social Influence (SI)	SI1	Cashless payment is trending.
	SI2	Family members believe that I should use cashless payment.
	SI3	Friends believe that I should use cashless payment.
Perceived Security and Privacy (TS)	SP1	Cashless payment ensures high security of personal information.
	SP2	Cashless payment services rarely have system errors during transactions.
	SP3	Cashless payment is reliable and ensures the money transfer is done successfully.
	SP4	The service is safe; no money is lost during the transaction.
Self-efficacy (SE)	SE1	I am able to use a cashless payment service when buying goods on E-commerce platforms without anyone's guidance.
	SE2	I am able to use a cashless payment service even when I have never tried it before.
	SE3	I am able to use the service proficiently within a short time.

	SE4	I can flexibly use various cashless payment methods (E-wallets, ATM cards, international payment cards, etc.)
Perceived Severity (PS)	PS1	COVID-19 may cause serious consequences for the community (eg. high risk of disease transmission to the community due to the working environment with many people, families with elderly people, etc.)
	PS2	COVID-19 may significantly affect my life (e.g. work, finance, daily activities, etc.)
	PS3	My life may be threatened if infected with COVID-19 due to a weak immune system or underlying disease.
	PS4	Many people around me may be affected by COVID-19 (e.g., friends and relatives must be isolated, confusing neighbours, colleagues, etc.)
Response Efficacy (RE)	RE1	Cashless payment helps reduce the risk of COVID-19 infection through cash infected with pathogens.
	RE2	Cashless payment helps reduce direct contact between buyers and shippers.
	RE3	Cashless payment helps better protect sellers and shippers during the pandemic.
	RE4	Cashless payment helps increase peace of mind when shopping on E-commerce platforms during the pandemic.

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