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# Using contactless mobile payment in the Vietnamese restaurant industry

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## Abstract:

**Purpose:** Contactless Mobile Payment (CMP) is a technological innovation that shapes the future of service-related industries. This study develops a critical understanding of CMP in the context of consumer behaviour and explores its use in the Vietnamese restaurant industry.

**Methods:** An online survey was used to collect the data ( $n=153$ ) from Vietnamese consumers. Data analysis was conducted with the use of SPSS and AMOS software. A Confirmatory Factor Analysis (CFA) in conjunction with Structural Equation Modelling (SEM) were employed to explore consumer perceptions regarding the use of CMP.

**Results:** The findings indicate that consumers find CMP a fast and convenient way to make transactions in Vietnamese restaurants. The findings also indicate the importance of ease of use and security.

**Implications:** The study contributes to the understanding of consumer behaviour in regard to technology in the service industries context focused on the restaurant industry. The managerial implications of this study highlight a number of benefits for both consumers and businesses, such as efficiency, speed, and improved customer service; on the other hand, the potential of fraud poses a serious threat for both sides.

**Keywords:** Consumer Behaviour, Contactless Mobile Payment, Restaurant Industry, Vietnam

**JEL Classification:** L83, N35, N7

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## 1 INTRODUCTION

The restaurant industry has long recognised service quality and customer satisfaction as key values for business survival (Hu et al., 2009). Aiming to stay competitive, companies in this sector try to minimise (human) errors, gain better customer insights and enhance their financial efficiency. To do this, restaurant operators have integrated technology into almost every step of their customer journey, from pre-purchase marketing to post-purchase customer review (Bilgihan and Wang, 2016). Emerging technologies, accepted by customers and adopted by restaurants, lead to such benefits as deeper engagement, more convenience, and enhanced restaurant experiences (Kabadayi et al., 2019). Traditionally, customer engagement in restaurants focused on the interactions between a host and the customer during a visit. With the spread of internet and mobile technology, the contact between restaurant owners and consumers has been extended much further and begins even before their demand for a restaurant meal is formed (EuroMonitor, 2018).

The rapid technological advancements have transformed consumer behaviour in the restaurant industry. Customers demand more control over their dining experience and want convenience, transparency and enjoyment. They can achieve these through use of advanced technologies (Saxena, 2021), which allow them to explore a wide range of choices through electronic menus, automated table service, small meals placed on rotating conveyor belts, and 'build-yourself' dishes. In addition, many restaurant chains today use food delivery mobile applications along with interactive Customer Relationship Management (CRM) systems (Kapoor and Vij, 2018). The result is that control of the conventional restaurant process is shifted to the customers' side, while restaurant owners are enabled to focus more on diversifying and improving service and food quality.

The role and importance of Contactless Mobile Payment (CMP) has received much attention from science in recent years (i.e., Dorcic et al. 2018; Susskind and Curry 2018). Kasavana (2006) predicted the widespread of CMP use in restaurants, as it could benefit all parties in the payment process: consumers gain more secure and expedient payment



experiences; restaurant operators gain customer satisfaction and trust; and banks strengthen their relationships with cardholders. However, despite the advantages of CMP over traditional payment methods, the use of CMP in the restaurant industry has not received appropriate attention from researchers, and restaurant consumers' acceptance of this new payment method is not sufficiently understood. Previous studies have mainly focused on the hotel industry (Morosan and Bowen, 2018), followed by studies on intermediation activities (Ruiz-Molina et al., 2010; Chatzigeorgiou et al., 2019), leaving the restaurant industry under-represented in academic research (DiPietro, 2017; Spyridou, 2017). In addition, other studies explored the implementation of CMP systems in particular countries (i.e., Lu et al. 2011; Schierz et al., 2010; Tan et al., 2014), with no existing research on CMP adoption in Vietnamese context, particularly in the restaurant sector. As such, this study's findings address the current literature gap and contribute to understanding this emerging payment system.

This study aims to understand how CMP is deployed in restaurants and the underlying motivations of Vietnamese customers' use of it. The paper first explores existing studies of CMP, then explains the research approach and methodology, next, presents the statistical analysis of the data collected, and, finally, discusses the study's conclusions and implications.

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## 2 LITERATURE REVIEW

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### 2.1 Consumer behaviour and CMP

The study of consumer behaviour investigates the decision-making process in regards to the purchase of products or services (Stankevich, 2017). This process includes the personal payment preferences for conducting transactions (Blythe, 2013). A consumer's decision to try and adopt a new technology is driven by the technology's usefulness, simplicity, associated risk, perceived cost, and consumer self-efficacy (Chandra et al., 2010). Jonker (2007) assumes that consumers typically prefer payment methods that bring pleasant and familiar experiences regardless of the cost of payment process, while Pollai et al. (2010) stated that consumers' preferences would be decided by their anticipations and feelings of the way that payment method addresses their demands for service satisfaction. In an effort to discover how consumers' perception leading to their decision to choose their payment instruments, Khan and Craig-Lees (2009) point out that people opinions towards electronic payments are much different compared to conventional money transactions. A technology that combines the use of smartphones and the benefits of credit card purchases has raised concerns for users, such as trust (Tobbin, 2010), security problems (Wang et al., 2016; Eze et al., 2008), accessibility (Wurster, 2014) and national legislation (Au and Kauffman, 2008).

It is not surprising that, the topic received much attention from scholars and researchers is the consumer's perceived security of this payment method (Wang et al., 2016). The increased likelihood of security breaches and payment fraud in mobile devices and applications, creates fear and loss of confidence for both consumers and businesses in these payment systems (Hampshire, 2017; Story et al., 2020). In

addition, consumers do not fully acknowledge the use of mobile wallet as a secure alternative to existing payment methods, or even fear that the government is monitoring and recording their transactions (Murdoch and Anderson, 2014; Zhou, 2015). As a result, the lack of awareness and education about mobile payment security, might ultimately delay the wider application of this payment method (Stiakakis et al., 2016). On the other hand, it can be argued that post COVID-19 studies regarding the application of CMP in the hospitality and tourism industry (i.e. Rahimzhan and Irani, 2021; Gursoy and Chi, 2020) indicate the wide spread of this payment method in global scale due to its unique characteristics, discussed in the following section.

### 2.2 CMP definition and characteristics

Contactless mobile payment (CMP) is currently recognised as the most popular medium for electronic payment across service industry sectors. CMP is defined by Gannamaneni et al. (2015) as a fast transaction that occurs between users' mobile devices and the merchant's point of sales (POS) devices through contactless technology. Contactless payment systems often rely on near-field communication (NFC). This is a new technology that falls under the radio-frequency identification (RFID) umbrella. Unlike RFID, which functions at a distance of many meters, NFC only works between objects separated by a short distance. Practically, this means there is no danger that a customer accidentally pays for somebody else's purchases (Walden, 2020). In general, CMP is easily accessible, convenient, effective, with secure mechanisms, backed by consistent standards and operational structures (Ruijun et al., 2010). In addition, it offers transparent communication configuration, mobility and consumes low-power energy (Egger, 2013; Teh et al., 2014). As a result, it lowers the operating costs of merchants and financial institutions while increasing business marketing capabilities and consumer expenditure (Olsen, 2008).

The proliferation of smartphones, sufficient infrastructure, increasing demand, and advanced security systems have driven the success of CMP around the globe. However, it can be argued that the rising trend is unequally distributed between markets and found primarily in pioneering and mature economies. Previous studies recognise inadequate adoption of CMP and expect adoption to match the availability of smart phones (Chandra et al., 2010; Rolfe, 2018; Zhou, 2013). Bourreau and Verdier (2010) argue that the uneven level of success of CMP is explained by the fact that developed countries possess well-built payment infrastructure and a high rate of consumers' (credit or debit) card ownership, while developing nations have limited and insufficient banking systems.

From a technical perspective, CMP implementation does not require sophisticated infrastructure to operate, suggesting that the key determinants of adoption of CMP in developing countries like Vietnam, are consumer's preferences, motivation, and behaviour. Egger (2013) states that, for any emerging technology, the critical concerns for all stakeholders are customer usage and acceptance, indicating that it is consumer demand significantly drives businesses' adoption of technology. This statement is aligned with the conclusion of Burgelman et al. (2004), as a service technology innovation could be successful only if accepted

by the market. The adoption of CMP depends on whether customer needs are generated, fully recognised, and successfully fulfilled; when this happens, it would be possible for CMP to replace existing payment instruments in consumer transactions (Viehland and Leong 2007).

### 2.3 CMP application in the restaurant sector

In the past decade, restaurants increasingly use CMP. US restaurants have rapidly adopted CMP, with year-over-year payment growth averaging 74 percent since 2013 (EuroMonitor, 2018; Del Chiappa et al., 2021). Restaurant and café multinational chains such as KFC, Chilli's and Starbucks accept Apple Pay, a mobile payment system available for iPhone users (Benner, 2015). The food and beverage sector in the UK is another example of CMP acceptance, with increased use in catering businesses (90 percent) and pubs and restaurants (79 percent and 90 percent, respectively) (Gerrard, 2016). In Mainland China, mobile payment transactions passed the US in early 2018 (Shen, 2018) with customers using Alipay and WeChat to purchase everything from street food to fine dining (Nielsen, 2018).

### 2.4 Research model and hypotheses development

The Technology Acceptance Model (TAM), introduced by Davis et al. (1989), is one of the most influential theories in Information Technology-related studies. Davis et al. (1989) suggested that an individual's attitude towards the application of a specific technology is decided by its perceived ease of use and usefulness and that, in turn, affects the actual use of the technology. The TAM is considered as a reliable theory in studying technology acceptance (Wu et al., 2011), and has been utilised in various fields, such as mobile payments and banking (Liébana-Cabanillas et al., 2017; Mehrad and Mohammadi, 2017; Ramos de Luna et al., 2016; Daskalaki et al., 2020). Considering its popularity and effectiveness, the TAM is used in our study. The original model includes two key constructs, namely, perceived usefulness and perceived ease of use, to explain the behaviour of customers. The original TAM has been criticised for focusing only on the technology itself, excluding other important psychological constructs that result in technology acceptance (Matemba, 2018). Therefore, in order to examine restaurant customers adoption of CMP adoption in Vietnam, this study uses TAM but also factors such as subjective norms and perceived security and compatibility.

#### *Perceived Usefulness (PU)*

Perceived usefulness is defined as the extent to which an individual assumes that using an identified technology improves efficiency and performance in daily work and life (Davis et al., 1989). A consumer is likely to utilise a particular technology if s/he perceives it as useful. In the case of CMP, despite its being faster and more accurate in processing transactions, a key reason for its slow and fragmented diffusion could be the failure of explaining those advantages to potential users. Previous studies confirmed the positive relationship of perceived usefulness on consumers' intention to use the technology (Leong et al., 2011; Ooi and Tan, 2016). In addition, Pham and Ho (2015), in their study of NFC mobile payments, found perceived usefulness to be the strongest predictor of customer acceptance. Thus, this study proposes the following hypothesis:

*H1: Perceived usefulness has a positive impact on consumers' intention to use CMP in restaurants*

#### *Perceived Ease of Use (PEOU)*

In the original TAM, the Perceived Ease of Use indicates "the degree to which a person believes that using a particular system would be free of effort" (Davis et al. 1989, p.?). As such, a new technology is likely to be adopted if consumers perceive it as easy to use or user-friendly and PEOU is a significant determinant of customers' acceptance of an innovative technology (Kim et al., 2010; Liébana-Cabanillas et al., 2015). However, PEOU's direct effect on intention to use has been debated with several scholars (Liébana-Cabanillas et al. 2017; Ooi and Tan 2016; Pham and Ho, 2015; Wu and Wang, 2005) finding an insignificant relationship between perceived ease of use and customers' intention to adopt a technology, supporting the view of Venkatesh (2000) that, as consumers become more proficient in using a certain technology over time, the importance of perceived ease of use is reduced or overshadowed by other factors.

Nevertheless, Davis et al.'s (1989) viewpoint has been supported by a number of studies arguing that most people assume an easy-to-use product is a useful product, and, in turn, are likely to utilise it (Chen and Chen 2011; Liébana-Cabanillas et al. 2017; Ramos de Luna et al. 2016;). Therefore, regarding perceived ease of use, this study suggests the following hypotheses:

*H2: Perceived ease of use has a positive impact on perceived usefulness of CMP in restaurants*

*H3: Perceived ease of use has a positive impact on consumers' intention to use CMP in restaurants*

#### *Perceived Security (PS)*

Perceived security describes the degree to which individuals consider a novel technology system secure for processing personal information and sensitive data (Chang and Chen, 2009). Security issues require more attention in the early stage of technology diffusion because people do not have sufficient understanding of the security features of the new system (Baker et al., 2002). It is essential to control the perceived security of the technology in order to address customers' concerns. For example, Shin's (2009) study of mobile wallet service revealed perceived security to be the most influential indicator of consumers' intention to use. Likewise, Oliveira et al. (2016) discovered its substantial impact on users' decision to use mobile payment instruments, second only to the impact of perceived compatibility. In addition, perceived security has been found to have a strong impact on the main constructs of the TAM, namely, perceived usefulness and ease of use (Khalilzadeh, 2016). Therefore, the following hypotheses are proposed:

*H4: Perceived security has a positive impact on the intention to use CMP in restaurants*

*H5: Perceived security has a positive impact on perceived usefulness of CMP in restaurants*

*H6: Perceived security has a positive impact on perceived ease of use of CMP in restaurants*

#### Subjective Norms (SN)

Subjective norms, also known as social influence (Venkatesh and Davis, 2000), are among the most commonly studied factors in information technology research (Dahlberg et al., 2015). Subjective norms refer to the extent to which persons appreciate the opinion of people who are important to them, on whether they should perform a particular action, or, in this case, use a technological system (Venkatesh and Bala, 2008). Similar to perceived security, the term is especially relevant during the initial stage of technology deployment, as customers in this period usually lack detailed and trustworthy information about the system. As a result, they have the tendency to rely strongly on their communication with peers to shape their decisions about use (Schierz et al., 2010). Furthermore, in a collectivist culture like Vietnam's, it is expected that peers' opinions would have greater impact on individuals (Hofstede, 2011), suggesting that subjective norms are even more important to this particular study. Thus, this study proposes the following hypotheses:

*H7: Subjective norms have a positive impact on perceived usefulness of CMP in restaurants*

*H8: Subjective norms have a positive impact on perceived ease of use of CMP in restaurants*

#### Perceived Compatibility (PC)

Another factor in the original TAM is the consumers' lifestyle compatibility, which has been described as a crucial driver of people's adoption of new technologies (Wang and Liao, 2008). In this study's context, the perceived compatibility can be defined as the degree to which payment systems are consistent with consumers' existing beliefs, knowledge, skills and (behavioural) habits (Lu et al., 2011). As one of the key success factors in technology deployment, a strong compatibility with consumers' lifestyles would significantly stimulate the mass diffusion of a technology (Pham and Ho, 2015). Moreover, a number of CMP-related studies (i.e., Pham and Ho, 2015; Ramos de Luna et al., 2016; Schierz et al. 2010) suggest perceived compatibility, compared to other factors, is the most powerful indicator of customers' intention to use a technology. These findings imply that restaurant customers might use CMP as their payment method if they believe that it fits into their lifestyle. Therefore, we suggest the following hypothesis:

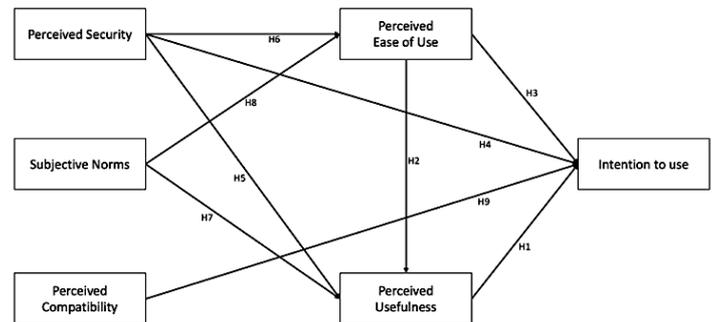
*H9: Perceived compatibility has a positive impact on consumers' intention to use CMP in restaurants*

#### Intention to use (ITU)

Defined as the psychological indicator of consumers' readiness to perform an action, intention to use is adopted by most TAM-based studies as the dependent variable of the conceptual model to predict consumer's actual use of the technology system (Liébana-Cabanillas et al., 2017). Therefore, this study adopts intention to use as a representation for customers' acceptance of CMP and assumes the construct to be a sufficient predictor of consumers' potential usage.

Based on the above discussion regarding the different dimensions of the TAM model and applying it to CMP in the Vietnamese restaurant industry context, the conceptual model of this study is presented in Figure 1 below:

Figure 1: Conceptual Model



## 3 RESEARCH METHODOLOGY

### 3.1 Survey Questionnaire Design

To test the conceptual model presented above, a quantitative research approach was employed. Due to COVID19 restrictions and the geographical spread of the sample, an online survey was used to collect the data. Wilson (2010) suggests an online questionnaire is an effective tool for reaching a wide range of participants. The study's questionnaire has three sections: the first asks participants to answer brief questions regarding the use of CMP in the restaurant industry; the second asks question about consumer behavioural intentions toward CMP and covers factors such as perceived usefulness (Bhattacharjee, 2001), ease of use (Davis et al., 1989), security (Parasuraman et al., 2005), compatibility (Christou et al., 2008; Plouffe et al., 2001), subjective norms (Venkatesh and Davis, 2000) and intention to use the technology (Schierz et al., 2010); the third section collects basic demographic data (age, gender, occupation, income) about participants. The questionnaire was initially designed in English and, then, translated into Vietnamese. Once the questionnaire was created in GoogleForms (a free online survey platform), a pilot study was conducted and all necessary adjustments made (Saunders et al., 2012); the pilot study was followed by the primary data collection phase. The study received approval from Bournemouth University's research ethics committee prior to the data collection stage, ensuring the confidentiality and anonymity of the participants' responses.

### 3.2 Sampling

Based on time and resource limitations, this study utilised the convenience sampling method, a non-probability technique. According to Saunders et al. (2012), a non-probability sampling technique does not clarify the research population, and the targeted sample must be administered by different criteria. A snowball sampling approach was adopted for the data collection. Snowball sampling refers to the technique in which each participant / individual would refer other relevant individuals to join the study and so on (Babbie 2010). According to Brickman-Bhutta (2012), the snowball sampling method is considered to be a timesaving, inexpensive way to collect survey data. In this study, the

targeted sample was Vietnamese consumers who could independently choose their payment method when using restaurant services. The survey questionnaire was created online and distributed through social media platforms like Facebook and LINE.

In order to ensure the reliability and validity of the collected data, a quantitative study requires a considerable sample size. Ghauri and Grohauug (2005) confirm this idea, while Bryman and Bell (2011) prove the benefit of a large research sample size in reducing the sampling error rate. Saunders et al. (2012) encourage the sample size to be above 50. For this study, the targeted sample size was 150 responses. 162 responses were received in total and checked for invalid or missing data; 9 responses were rejected, and 153 valid responses were utilised for the data analysis. The sample size (n=153) in this study meets the requirement of Hair et al. (2010) for a minimum sufficient size between 100 and 200 for the Structural Equation Modelling (SEM) technique and maximum likelihood estimation methods (Sigala and Christou, 2014). The demographic characteristics of the participants varied in terms of age, gender, income and occupation.

**3.3 Data analysis**

The data analysis was conducted in two parts, namely, descriptive and inferential statistics, with the use of SPSS and AMOS software, respectively. The descriptive analysis is considered to be capable of generating numerical interpretation and comparison between items and constructs (Saunders et al., 2012). In this study, the demographic profile section is illustrated by using frequency tables. In addition, mean value and standard deviation were utilised to interpret the constructs, as measured by the Likert scale. Moreover, statistical techniques for comparison, including t-test and one-way ANOVA (Ross and Willson, 2017), were adopted to examine whether or not there is any difference between social groups in their intention to use CMP.

Following this, an inferential analysis was conducted; this is described as the statistical method for processing quantitative data in order to generate conclusions on a random sample population (Collis and Hussey, 2014). The stage begins with an exploratory factor analysis (EFA) to clarify and optimise the underlying structure of the data. Next, a confirmatory factor analysis (CFA) is conducted to evaluate the composite reliability for each factor, as well as the convergent validity and discriminant validity (Hair et al., 2010) of the measurement model. Then, the structural equation modelling (SEM) is performed to assess the relationships between conceptual variables, including perceived usefulness, perceived ease of use, subjective norms, perceived security, perceived compatibility and customers’ intention to use. The SEM technique is well-known for its ability to examine the inter-related and dependent relationship between latent variables (Tarka, 2018). A test of overall fit of the structural model was conducted prior to the hypotheses testing step (Byrne, 2010), and, in turn, comprehensive discussion and sophisticated implications were derived from the results.

**4 FINDINGS AND ANALYSIS**

**4.1 Demographic profile**

The sample in this study was dominated by females (71.2%), with males constituting 28.8%. In terms of age, the largest proportion belongs to Generation Z, followed by Millennials (75.8% and 20.9%, respectively). This was not a surprise, as the survey was conducted online, and Vietnamese young people are technically savvy and among the most active people in social media (Nguyen, 2015). In addition, almost half of the participants were part-time employees (47.1%), while students account for an approximately equal percentage (45.1%). Full-time workers comprise only 5.2% of total respondents, and the number of unemployed and retired people was insignificant.

The educational profile revealed that more than half of the participants (58.8%) were holders of a university degree or postgraduates (39.9%). This suggests that the educational proficiency of respondents was relatively high, and, thus, it should be expected that they are fully capable of judging and making logical decisions in using technology systems. Lastly, in terms of income, the majority of participants’ monthly salary at the 3-10 million VND range (30.7%), and two groups at 23.5%, namely below-3-million-VND and 10-to-20-million-VND people. In addition, the highest income class constitutes the smallest percentage of the whole, at only 2.6%. The income profile in this study suggests that almost 75% of the respondents are above the average level, as Vietnamese GDP per capita is 2,700 USD per year (Worldbank, 2020). Also, these salary levels are considered to provide enough income stability for the potential consumer to purchase restaurant services.

*Table 1: Familiarity with CMP*

Frequencies of CMP experience			
Having acknowledged of the term CMP	Count	Percent (%)	Cumulative (%)
No	28	18.3	18.3
Yes	125	81.7	100.0
Total	153	100.0	

Used CMP generally	Count	Percent (%)	Cumulative (%)
No	9	5.9	5.9
Yes	144	94.1	100.0
Total	153	100.0	

Experienced CMP in restaurants	Count	Percent (%)	Cumulative (%)
No	26	17.0	17.0
Yes	127	83.0	100.0
Total	153	100.0	

Cross relations

Valid N: 153	Frequency	Percent (of total)
Having acknowledged but never used before	3	1.96
Used without acknowledgement of CMP	22	14.38
Used CMP generally but not in restaurants	17	11.11

Popular types of CMP in Vietnamese restaurant market

Valid N: 153	Frequency	Percent (of total)
Mobile wallet	124	81.0
Smart card and phone	90	58.8
Wearables	34	22.2
No use	9	5.9

The sample population generally had experience using CMP, although there are some slight, yet insignificant gaps regarding people who used CMP who had never heard of the technology or consumers who used the payment system but not in restaurants (Table 1). Vietnamese customers seem to be most familiar with mobile wallet (81% of total participants used the application), followed by smart cards and phones at 58.8% and wearables at 22.2%.

#### 4.2 Factors influencing customers' intention to use CMP

This section demonstrates the factors affecting customers' intention to adopt and interpret their overall acceptance of CMP by looking at the mean and standard deviation of each item in Tables 2 and 3. The findings suggest that participants mostly agree with statements that CMP is useful and easy to use, with all mean values above 4, meaning that the customers recognise the practical benefits and advantages of the new payment system. In addition, features related to perceived security and perceived compatibility recorded their mean values above 3, suggesting that the respondents generally perceive CMP as secure and that it fitted with their lifestyle, to a moderate extent. As this technology is still in its infancy in the Vietnamese market, it should be expected that customers' perceived security and compatibility will positively improve over time as consumers become more proficient and familiar with it.

Table 2: Descriptive statistics of measurement items

	Content	Mean	SD
PU1	Contactless mobile payment system is useful mode of payment	4.32	.749
PU2	Using contactless mobile payment makes the handling of payments easier	4.27	.778
PU3	Contactless mobile payment system allows quick use of mobile applications (for example, ticket purchases, and use of mobile coupons, etc.)	4.25	.839
PEOU1	It is easy to proficiently master how to use contactless mobile payment system	4.12	.743
PEOU2	Interactions with contactless mobile payment system are clear and understandable	4.01	.811
PEOU3	It is easy to follow all the steps to use contactless mobile payment system	4.08	.794
PEOU4	It is easy to interact contactless mobile payment system	4.04	.794
SN1	People who are important to me think it is a good idea to use contactless mobile payment systems	3.65	.772
SN2	People who are important to me would recommend using contactless mobile payment system	3.41	.815
SN3	People who are important to me view contactless mobile payment system as beneficial	3.65	.748
PS1	The risk of an unauthorised party intervening in the payment process is low	3.22	.926
PS2	The risk of abuse of usage information (e.g., names of business partners, payment amount) is low when using contactless mobile payment system	3.20	1.002
PS3	The risk of abuse of billing information (e.g., credit card number, bank account data) is low when using contactless mobile payment	3.15	.972
PC1	I would appreciate using contactless mobile payment services in restaurant/cafe/bar instead of alternative modes of payment (e.g., credit card, cash)	3.89	.847
PC2	I think contactless mobile payment system is compatible with my lifestyle	3.93	.859
PC3	Using contactless mobile payment at a restaurant/cafe/bar fits well with the way I like to purchase products and services	3.90	.879
ITU1	Given the opportunity, I will use contactless mobile payment system	4.27	.728
ITU2	I am likely to use contactless mobile payment system in the near future	4.21	.749
ITU3	I am open to using contactless mobile payment system in the near future	4.30	.717
ITU4	I intend to use contactless mobile payment system when the opportunity arises	4.22	.842
Valid N (listwise): 153			

On the other hand, subjective norms recorded a mean value between 3 and 4, indicating that consumers' choice are, indeed, affected by peers' opinions, but the effect is not strong, which could be because the sample contains mostly young and well-educated people, and they are likely to be highly deliberate and possess sufficient knowledge to make decisions about CMP adoption by themselves. Lastly, the intention to use construct and its items recorded their mean values above 4, demonstrating a Vietnamese consumers' positive acceptance and strong willingness to utilise CMP. This finding can be linked to Gincel's (2010) argument that young consumers are generally more responsive to the introduction of new technology, particularly payment systems

Table 3: Descriptive statistics of constructs

* =MEAN (items)	N of items	CR Alpha	Mean	SD
Perceived usefulness*	3	0.922	4.28	.735
Perceived ease of use*	4	0.961	4.06	.744
Subjective norms*	3	0.832	3.57	.674
Perceived security*	3	0.861	3.19	.856
Perceived compatibility*	3	0.847	3.91	.755
Intention to use*	4	0.938	4.25	.698
Valid N (listwise): 153				

For comparison purposes, two types of statistical techniques were employed, independent t-test for examining the differences between males and females and one-way ANOVA for age, income, education background and occupation groups (Table 4). To be more specific, an independent samples t-test is adopted for groups containing only two components (like male and female in this study) to assess whether or not those two have equal means. Meanwhile, one-way ANOVA (analysis of variance) is a statistical technique designed for a similar purpose but used when there are three or more sub-groups within the larger group. As the results in table 4.7 show, overall, there was no observable difference between males and females ( $t=0.00$ ,  $p\text{-value}=1.00$ ), age ( $F=1.115$ ,  $p\text{-value}=0.352$ ), income ( $F=1.023$ ,  $p\text{-value}=0.406$ ), education ( $F=0.851$ ,  $p\text{-value}=0.429$ ) or occupation ( $F=0.576$ ,  $p\text{-value}=0.680$ ) within this study's sample population. Combined with the results of the previous section, it can be suggested that Vietnamese consumers generally accept CMP adoption and demonstrate a favourable attitude towards it.

Table 4: 'Intention to use' comparison between groups

T-test Results (on intention to use)			
	t	Sig. (2-tailed)	Result
Gender	.000	1.000	No significant difference

One-way ANOVA Results (between groups – on intention to use)			
	F	Sig.	Result
Age group	1.115	.352	No significant difference
Income	1.023	.406	No significant difference
Educational level	.851	.429	No significant difference
Occupation	.576	.680	No significant difference

#### 4.3 Exploratory Factor Analysis (EFA)

As a preliminary step to explore the underlying structure of the data, an exploratory factor analysis (EFA) was conducted, using Principle axis factoring technique and Promax rotation, combined with the parallel analysis technique to precisely determine the number of factors to load into further analysis.

As shown in Table 5, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy scored 0.879, which could be considered an excellent statistic, as it surpassed the recommended level of 0.50 (Hair et al., 2010) and indicates that the items' score for any extracted factor was adequate. In addition, the Bartlett's Test result was significant ( $\chi^2 = 2626.688$ ;  $df = 190$ ), with its p-value (= 0.000) less than 0.05, demonstrating solid correlations between items within a factor and ensuring the input data to be appropriate for EFA. The results indicated that six factors were retained in the measurement model, which matches the number of factors from this study's conceptual model. Then, a second EFA was conducted, with the results displayed in Table 7. Twenty measurement variables were reduced into six factors, explaining 76.08% of total data variance. Also, factor loadings spread between 0.663 and 1.009, which are relatively high and satisfied the given requirement of above 0.50 from Hair et al. (2010); therefore, no item was removed.

Table 5: KMO and Bartlett's Test from EFA

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.879
Bartlett's Test of Sphericity	Approx. Chi-Square	2626.688
	df	190
	Sig.	.000

Table 6: Eigenvalue results to determine factors retained

Factor	Initial EFA Eigenvalues		Parallel random results*		Extraction Sums of Squared Loadings	
	Total	Cumulative %	Random eigenvalues	Total	Cumulative %	
1	8.540	42.700	1.2734	8.290	41.451	
2	2.655	55.977	1.1391	2.404	53.471	
3	2.054	66.248	1.0383	1.773	62.336	
4	1.543	73.965	0.9472	1.210	68.388	
5	1.025	79.090	0.8548	.791	72.345	
6	0.869	83.436	0.7471			
7	0.486	85.867	0.7321			

\*generated by software designed from Watkins (2008)

Table 7: Second EFA results (total variance explained and factor loadings)

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.540	42.700	42.700	8.329	41.643	41.643
2	2.655	13.277	55.977	2.452	12.258	53.901
3	2.054	10.272	66.248	1.781	8.904	62.805
4	1.543	7.716	73.965	1.216	6.079	68.884
5	1.025	5.125	79.090	.810	4.052	72.936
6	.869	4.346	83.436	.629	3.145	76.080
7	.486	2.431	85.867			

	Pattern Matrix Factor					
	1	2	3	4	5	6
ITU3	1.009					
ITU1	.934					
ITU2	.855					
ITU4	.663					
PEOU3		.954				
PEOU4		.898				
PEOU1		.893				
PEOU2		.890				
PU2			.927			
PU1			.836			
PU3			.799			
PS2				.904		
PS1				.795		
PS3				.757		
SN3					.804	
SN1					.770	
SN2					.768	
PC2						.802
PC3						.728
PC1						.715

Table 8: Measurement model fits

Indicator	Threshold	Result	Indicator	Threshold	Result
$\chi^2/df$	$\leq 2$	1.544	CFI	$\geq 0.90$	0.967
GFI	$\geq 0.80$	0.87	TLI	$\geq 0.90$	0.96
SRMR	$\leq 0.05$	0.045	RMSEA	$\leq 0.06$	0.06

Note: Normed Chi-square to Degree-of-freedom =  $\chi^2/df$ ; GFI = Goodness of Fit Index; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; SRMR = Standardised Root Mean Square Residual and RMSEA = Root Mean Square Error of Approximation.  
Source: Hair et al. (2010); Hu and Bentler (1999); Baumgartner and Homburg (1996)

4.4 Confirmatory factor analysis (CFA)

The psychometric properties of the measurement model, regarding its reliability and convergent and discriminant validity, were also assessed. The calculated results are shown in Tables 9 and 10. Firstly, in terms of reliability and convergence validity, composite reliability (CR) values for all factors were higher than 0.70, while average variance extracted (AVE) of all were higher than the 0.50 level suggested by Hair et al. (2010). Additionally, all measurement items' loadings, ranging from 0.745 to 0.953, above the minimum threshold of 0.50, were highly significant. Besides, the value of Cronbach's Alpha, to assess the internal consistency of all constructs, ranged from 0.832 to 0.961 and surpassed the recommended level of 0.70. Therefore, the measurement model is considered to be reliable and its convergent validity ensured.

Table 9: Measurement model reliability and validity indices

Construct	Item	Loading	P	Cronbach's Alpha	CR	AVE	MSV
Intention to use	ITU3	.953		0.938	0.942	0.803	0.507
	ITU1	.912	***				
	ITU2	.866	***				
	ITU4	.848	***				
Perceived ease of use	PEOU3	.942		0.961	0.961	0.862	0.521
	PEOU4	.926	***				
	PEOU1	.898	***				
	PEOU2	.947	***				
Perceived usefulness	PU2	.917		0.922	0.925	0.803	0.521
	PU1	.905	***				
	PU3	.866	***				
Perceived security	PS2	.885		0.861	0.863	0.679	0.134
	PS1	.816	***				
	PS3	.768	***				
Subjective norms	SN3	.797		0.832	0.833	0.625	0.248
	SN1	.825	***				
	SN2	.748	***				
Perceived compatibility	PC2	.822		0.847	0.849	0.653	0.507
	PC3	.745	***				
	PC1	.853	***				

Next, to assess the model's discriminant validity, this study compared the square root of AVE value with the between-construct correlation coefficients. As Table 10 demonstrates, the square root of AVE of all values was greater than the correlation coefficients between any two constructs. Also, the results that AVE values surpassed the maximum shared variance (MSV) also give support to the discriminant validity of this study's measurement model.

Table 10: Square root of the AVE and construct correlations

	Intention to use	Perceived ease of use	Perceived usefulness	Perceived security	Subjective norms	Perceived compatibility
Intention to use	<b>0.896</b>					
Perceived ease of use	0.406***	<b>0.928</b>				
Perceived usefulness	0.438***	0.722***	<b>0.896</b>			
Perceived security	0.192*	0.354***	0.294**	<b>0.824</b>		
Subjective norms	0.347***	0.498***	0.394***	0.366***	<b>0.791</b>	
Perceived compatibility	0.712***	0.512***	0.464***	0.344***	0.449***	<b>0.808</b>

## 5 DISCUSSION AND HYPOTHESIS TESTING

To test the hypotheses of the conceptual model, this study adopted Structural Equation Modelling (SEM) with maximum likelihood estimation. After reorganising the CFA model to form the structural model containing nine hypotheses, the research team first assessed the fit measures of this model. Using the similar set of indices, this study concluded that the structural model demonstrated an acceptable fit, with the results adequately meeting the suggested cut-off (Hair et al. 2010; Hu and Bentler 1999; Baumgartner and Homburg 1995):  $\chi^2/df = 1.524$ , GFI = 0.868, CFI = 0.968, TLI = 0.961 and RMSEA = 0.059. The hypotheses testing results are displayed in Table 11. Out of nine proposed hypotheses, five hypotheses were supported, namely H1, H2, H6, H8 and H9, and other hypotheses were rejected.

Table 11: Hypotheses testing results

Hypotheses	Standardised Coefficient	P	Result
H1 Usefulness => Intention	.198	.044	Support
H2 Ease of use => Usefulness	.668	***	Support
H3 Ease of use => Intention	-.010	.916	Not Support
H4 Security => Intention	-.093	.237	Not Support
H5 Security => Usefulness	.045	.539	Not Support
H6 Security => Ease of use	.200	.019	Support
H7 Subjective norms => Usefulness	.054	.517	Not Support
H8 Subjective norms => Ease of use	.442	***	Support
H9 Compatibility => Intention	.679	***	Support

*H1: Perceived usefulness has a positive impact on consumer's intention to use CMP in restaurants*

The results for H1 from calculation of the structural model recorded  $\beta = 0.198$  and  $p\text{-value} = 0.044$  ( $<0.05$ ). Therefore, H1 is supported, and it could be concluded that the more consumers consider CMP as useful and beneficial, the more likely and frequently they will use it. Consistent with previous literature (i.e. Morosan and DeFranco, 2016; Tan et al., 2014), this study emphasises the relevance of perceived usefulness in influencing customers' intention to adopt the system, implying that to improve consumers' acceptance and

behavioural intentions towards CMP, the functional aspect of the system should be enhanced, and that appropriate marketing strategies are needed to raise consumers' understanding of CMP.

*H2: Perceived ease of use has a positive impact on perceived usefulness of CMP in restaurants*

*H3: Perceived ease of use has a positive impact on consumers' intention to use CMP in restaurants*

From the calculated results of two hypotheses related to perceived ease of use, it could be seen that H2 ( $\beta = 0.668$ ,  $p\text{-value} = 0.000$ ) was supported, while H3 ( $\beta = -0.010$ ,  $p\text{-value} = 0.916$ ) was rejected. Therefore, it could be concluded that perceived ease of use has a positive and significant impact on Vietnamese customers' perceived usefulness, but no significant effect on their intention to use CMP in restaurants. These findings mean that, although consumers recognise the new payment form to be simple and easy to use, it is not guaranteed that they will use CMP as their payment method; however, they are likely to consider it as useful to them compared to other systems that are more difficult to adopt. As such, the result of insignificant relationship between perceived ease of use and the intention to use is aligned with the studies of Pham and Ho (2015) and Liébana-Cabanillas et al. (2017). In addition to the increasing popularity of mobile and digital payments, this finding might be explained by this study's participants being younger Vietnamese who are technologically savvy, knowledgeable about and well-experienced with mobile devices, and, consequently, whose perception of ease of use is not a key factor in determining their behavioural intentions towards CMP. On the other hand, the finding of the significant effect of perceived ease of use to perceived usefulness is aligned with the existing literature (i.e., Chen and Chen 2011; Liébana-Cabanillas et al., 2017; Kim et al., 2010), confirming that customers' perception of CMP ease of use is an important predictor for usefulness in restaurant services.

*H4: Perceived security has a positive impact on the intention to use CMP in restaurants*

*H5: Perceived security has a positive impact on perceived usefulness of CMP in restaurants*

*H6: Perceived security has a positive impact on perceived ease of use of CMP in restaurants*

The results for three hypotheses related to perceived security were mixed, with H6 ( $\beta = 0.200$  and  $p\text{-value} = 0.019$ ) being supported, while H4 ( $\beta = -0.093$ ,  $p\text{-value} = 0.237$ ) and hypothesis 5 ( $\beta = 0.045$ ,  $p\text{-value} = 0.539$ ) being rejected. Surprisingly, these findings are, to some extent, in contrast with previous studies from Shin (2009) and Oliveira et al. (2016), suggesting that restaurant consumers in Vietnam are unaware of possible threats in digital payment systems. Some explanations for this include (1) the information security infrastructure in Vietnam is still under-developed; (2) Vietnamese customers have not been well-educated about security concerns in information technology and rarely experience or acknowledge those situations; and (3) current

users might expect that banks would be in charge of addressing any issues regarding digital payments. With that being said, this construct is still valuable and worth considering in information technology research, as its effect on perceived ease of use was confirmed, supporting its importance as established by various scholars (i.e., Kim et al., 2010; Oliveira et al., 2016; Shin, 2009). The Vietnamese market is increasingly mature, and it should be expected that perceived security will gain more attention over time.

*H7: Subjective norms have a positive impact on perceived usefulness of CMP in restaurants*

*H8: Subjective norms have a positive impact on perceived ease of use of CMP in restaurants*

The results for two hypotheses related to subjective norms were also mixed, with H7 ( $\beta = 0.054$ , p-value = 0.517) being rejected and H8 ( $\beta = 0.442$ , p-value = 0.000) being supported, indicating that subjective norms would enable Vietnamese customers to perceive CMP as easy and simple to use, but not ensure whether they consider the new payment system as useful or not. To be more specific, there was no direct and significant impact of subjective norms on perceived usefulness, a finding which disagrees with Willis (2008) and Liébana-Cabanillas et al. (2017). This might, again, be explained by this study's youthful sample population, as Generation Z and Millennials are highly determined and have the tendency to make their decisions independently. The high educational attainment of these participants also indicates that they are capable of evaluating the usefulness of CMP by themselves, unaffected by peer opinions.

Meanwhile, that subjective norms demonstrated a positive and significant impact on perceived ease of use is aligned with the findings of Yang et al. (2012) and Ramos de Luna et al. (2016). Mao et al. (2005) pointed out that perceived ease of use was more important than perceived usefulness in non-Western countries. Still, considering this mixed result, it would require more in-depth research on the Vietnamese CMP market to confirm the impact of subjective norms on others.

*H9: Perceived compatibility has a positive impact on consumers' intention to use CMP in restaurants.*

H9 recorded its  $\beta = 0.679$  and p-value = 0.000, indicating that perceived compatibility had the most significant and positive impact on Vietnamese consumers' intention to use CMP in restaurant services. In other words, the more Vietnamese consumers regard CMP as compatible and matched with their lifestyle, belief and experiences, the more favourable is their intention to use the technology in restaurants. This finding provides support to the studies of Schierz et al. (2010) and Pham and Ho (2015) in recognising the greatest impacts of perceived compatibility to the intention to use compared to that of other constructs, and, in turn, reminds restaurant operators and other industry players to emphasise this factor in CMP deployment.

## 6 CONCLUSIONS

The findings of this study are aligned with the existing CMP research in the context of consumer behaviour literature and reveals that the Vietnamese customers' recent perception has been favourable towards the use of CMP in the restaurant sector. No difference was identified between users with diverse demographic characteristics in their intention to adopt this payment technology. In other words, the Vietnamese consumers generally accept the CMP application in restaurants. The results demonstrate the significance of customers' perceived compatibility and their perception of usefulness on the intention to use CMP in restaurants, while preserving indirect importance of other factors, namely, perceived ease of use, subjective norms and perceived security. From that basis, different implications are provided below.

This study contributes to the area of consumer behaviour in conjunction with the use of information technology in the service industries context. The study provides insights into how customer acceptance of contactless payment is shaped by different factors, and it is the first of its kind in the Vietnamese restaurant industry. The results demonstrate the significance of customers' perceived compatibility and their perception of usefulness on the intention to use CMP in restaurants, while preserving indirect importance of other factors, namely perceived ease of use, subjective norms and perceived security.

The managerial implications of this study highlight a number of benefits for both consumers and businesses, such as efficiency, speed, and improved customer service; on the other hand, the potential of fraud poses a serious threat for both sides. It is essential for business owners, service operators and other players in the restaurant industry to distribute scarce resources and invest in available touchpoints to appropriately integrate one of the fastest emerging technology systems, the CMP, into their existing infrastructure. This study highlights the strong impact of the compatibility construct on shaping customer intention to use CMP as their payment method. Restaurant marketers and CMP providers should conduct applied market research to understand their target customer segment, their core values, habits and beliefs, and, in turn, design appropriate promotion and marketing strategies that match their preferences. As modern consumers are becoming busier with a dynamic lifestyle, the system should be marketed as a lifestyle product, with focus on its advantage of being able to help consumers to complete tasks with minimum time spent. In addition, based on the fact that young consumer groups such as Millennials and Generation Z are among the earliest and most enthusiastic CMP users, marketing promotion campaigns should portray it as a flexible, unique, trendy and frequently used payment method. These consumers should also be encouraged to interact and share their experiences and understanding of using CMP through social media channels, for commercial operators to utilise the network effect.

The limited sample size, due to time and resources restrictions, is recognised as the key limitation of this study. Future studies should be conducted with a broader methodology in mind (i.e mixed methods) applied in different sectors of the Vietnamese service industry, such as

hospitality, transportation, banking, retail, etc. In addition, comparative studies between different countries would also contribute to our understanding of consumer preferences in different sociocultural contexts.

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