

The Impacts of Facilitating and Inhibiting Factors on Usage Intention of Mobile Payment Services

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Abstract: Mobile commerce has been booming with the development of mobile technology, which has made mobile payment services highly valued by mobile payment service providers and consumers. This study integrated facilitating factors (perceived transaction convenience, social influence, additional value, government support) and inhibiting factors (psychological risk, financial risk, privacy risk) to explore which ones influence users' usage intentions to use mobile payment services. A research model was developed and empirically tested by using structural equation modeling (SEM) on datasets consisting of 602 mobile payment services users through an online survey questionnaire in Taiwan. Our findings show that the facilitating factors had a significant positive impact on usage intention, with the greatest impact from the factor of government support. Moreover, perceived risk had a significant negative impact on usage intention, with the greatest impact from the factor of financial risk. Therefore, this indicates that consumers take whether there is a financial loss in the process of using mobile payment service into consideration as the major factor to use it.

Keywords: Mobile payment; facilitating factor; inhibiting factor; usage intention.

1. Introduction

With the popularity of smartphones, mobile payment applications are more common, replacing traditional payment procedures and becoming a more convenient and safer payment method [1]. Mobile payment is defined as a way to pay for goods/services with mobile devices (e.g. smartphone) [2]. It is forecasted that worldwide mobile payment transaction volume will increase from US\$4.3 trillion in 2018 to US\$11.14 trillion in 2021, while the number of global mobile payment users is expected to grow from 830 million in 2018 to 11.1 billion in 2021 [3]. According to the survey of Financial Supervisory Commission (FSC) [4], by July 2019 there were 5.55 million mobile phone subscribers adopting mobile payment services, accounting for about 28.5% of the adult population. Therefore, there is a need to examine what facilitates and prevents consumers from adopting mobile payment services, which will be valuable for Taiwan mobile payment service providers that wish to promote m-payment acceptance. Previous studies mostly used TAM (Technology Acceptance Model) [5-8], UTAUT (Unified Theory of Acceptance and Use of Technology) [9, 10], UTAUT2 (Unified Theory of Acceptance and Use of Technology) [11-15], and integrated TAM and UTAUT [16, 17] to investigate the behavior intentions of mobile payment services usage. However, as these studies focused on technology adoption factors (e.g. perceived ease of use and perceived usefulness etc.), they ignored other influencing factors (e.g. perceived risk, government support, and additional value) to adopt

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mobile payment services in Taiwan. Indeed, the majority of consumers seems to be aware of the potential risks of mobile payment, like privacy risk, financial risk, and psychological risk. Without a doubt, it seems they may have strong concerns about the potential risks of adopting mobile payment. However, only little attention in previous studies have been paid to study facilitators like government support and additional value. Hence, this study integrated facilitating and inhibiting factors to explore which one influence users' usage intentions toward using mobile payment services in Taiwan.

Teo et al. [9], Ozturk et al. [18] and Gao and Waechter [19] pointed out that perceived transaction convenience can affect a user's willingness to use mobile payment services, because they are more convenient than traditional payment means. Some previous studies have indicated that relatives and friends can influence consumers' willingness to accept mobile commerce. Therefore, in recent years many studies related to mobile payment have taken social influence as one of the variables of discussion [12, 13, 15, 17, 20, 21]. Government support is also included in various studies [22-25]. In particular, mobile payment is an innovative technology, so it needs to have government support. For this reason, this study included government support in the research model. Furthermore, according to the statistics of MIC in 2018, favorable value is the second most important reason for users to consider using mobile payment. Thus, this study utilized additional value as a research variable. Based on the explanation above, this study took the four factors of perceived transaction convenience, social influence, government support, and additional value as perceived by the users to be the facilitating factors of whether to use mobile payment services so as to discuss their influence on usage intention.

The risks consumers are concerned about when using mobile payment are very diverse. Perceived risk refers to the extent that consumers perceive the possible losses which could be created due to the adoption of mobile payment services [26]. The losses include any unexpected outcomes to consumer, such as financial loss, the violation of privacy, and psychological anxiety. In the past, many studies divided risk into multiple facets, such as performance risk, financial risk, time risk, psychological risk, social risk, and privacy risk [13, 17, 26-30]. Because the use of mobile payment is not time-consuming and incurs no change of social status, this study excluded these two factors as variables. This study combined financial risk, psychological risk, and privacy risk as a perceived overall risk and took this perceived risk as the inhibiting factor of consumers not using mobile payment services. This study presented the perceived overall risk in a second-order manner and added the facilitating factors (perceived transaction convenience, social influence, government support, and additional value) to explore which ones influence user to put mobile payment services into use.

2. Research Background and Hypothesis Development

2.1 Facilitating Factors

2.1.1 Perceived Transaction Convenience and Usage Intention

Perceived transaction convenience is described as “consumers” perceived effort and time spent on a transaction process [31]. In other words, perceived transaction convenience indicates that consumers perceive the time and energy that a product or service can save for them. There have been several studies on the perceived transaction convenience in recent years. Jiang et al. [32] discussed perceived transaction convenience for online shopping and concluded that it has a positive impact on usage intention. Tan et al. [6] used it in the research on the use of Near-field communication smartphones and found that perceived transaction convenience positively influences behavioral intention. Teo et al. [9], Ozturk et al. [18], Gao and Waechter [19], Teh et al. [33] and Williams [34] conducted research on mobile payment users, and the results showed that perceived transaction convenience positively affects behavioral intentions. Therefore, we proposed the following hypothesis:

H1: Perceived transaction convenience positively affects adoption intention.

2.1.2 Social Influence and Usage Intention

Wong et al. [35] suggested that social influence is the degree that an individual perceives that other people think he should use this new system. In other words, consumers’ behavior can be influenced by the opinions of families, friends, and other people around them. Teo et al. [9], Koenig-Lewis et al. [16], and Nasri & Charfeddine [36] also concluded that social influence has a positive impact on the mobile payment in the process of using mobile banking. Previous studies regarding mobile services included the following aspects: mobile banking, mobile APP, and mobile payment [8,12,13,15,17], which all showed that social influence positively affects usage intention. Therefore, the following hypothesis was formulated:

H2: Social influence positively affects adoption intention.

2.1.3 Governmental Support and Usage Intention

Teo and Tan [9] defined government support as "government assistance", and believed that government support can play an intervening and leading role in the diffusion of technological innovation. As government regulations can encourage or hinder the adoption of innovative things, government support can also play an intermediary and leading role in the spread of technological innovation [37]. Nasri and Charfeddine [36] pointed out in their research on a mobile bank that government support has a positive impact on behavioral intention. Raza & Hanif [22] studied factors affecting customers’ adoption of online banking and found that government support can increase users’ intention to use online banking services. Regarding the adoption of electronic data interchange (EDI) and SCRM (Social Customer Relationship Management), Rawashdeh and Al-namlah [24] and Hasani and Bojei [25] indicated that government support may enhance the intention of enterprises to adopt EDI and SCRM. Therefore, this paper proposes the following hypothesis:

H3: Governmental support influence positively affects adoption intention.

2.1.4 Additional Value and Usage Intention

Additional value refers to the degree to which mobile payments users obtain the financial benefits (discounted prices, promotions, free e-coupons, etc.) of using the mobile payment services; users are unlikely to switch to mobile payment unless additional value is provided [38]. When users obtain additional value such as price discounts and coupons from their phones, they can be stimulated to use mobile payment [39]. Aydin & Burnaz [21] believed that rewards in the form of actual benefits such as money, coupons, free samples, gifts, and sweepstakes can motivate consumers and enhance their usage intention. Koohikamali et al. [40] noted that if people gain additional external benefits when engaging in a certain behavior, then they may perform this behavior as long as the benefits are valuable. Richard & Meuli [41] proved in their research on mobile advertising that the benefits and discounts attached to mobile services have a positive impact on consumers' behavior intention. Pham and Ho [38] held that, unless additional services are provided to additional value, users are unlikely to switch to use mobile payment. Therefore, this paper proposes the following hypothesis:

H4: Additional value positively affects adoption intention.

2.2 Inhibitor Factors

2.2.1 Perceived Overall Risk

Perceived risk refers to the extent to which consumers perceive the possible losses that could be created due to adopt mobile payment services [26]. Previous studies indicate that perceived risk is a multi-dimensional construct in online commerce contexts [2, 26, 28, 42-47]; previous researches used financial risk, privacy risk, psychological risk, time risk, and social risk as the most common variables. Perceived financial risk refers to consumer perception about the possible monetary loss caused by the usage of mobile payment [42, 26]. Perceived privacy risk refers to consumer perception about the possible exposure of a user's private information is termed perceived privacy risk [42, 26]. Perceived psychological risk refers to consumer's perception of any possible psychological anxiety resulting from the use of mobile payment services [47]. Perceived time risk refers to consumer's perception to any possible time wasting associated with usage of mobile payment [46, 47]. Perceived social risk refers to the consumer's fear that other people consider the choice inappropriate thus embarrassing consumer due to usage mobile payment [46]. However, Martins et al. [28] and Ruiz-Mafé et al. [46] pointed out that people do not mind whether the use of online banking will affect their public image. For this reason, social risk was not included in this study. Yang et al. [26] and Ruiz-Mafé et al. [46] conducted a study on mobile payment and found that time consumption does not impair the value and usage intention of consumers for mobile payment, and so this study also excluded time risk as a variable. Hence, we adopt a three-dimensional measurement of perceived risk in mobile payment, including perceived financial risk, privacy risk, and psychological risk.

Previous studies [2, 28, 44-47] have integrated perceived risk as a second-order index to explain mobile payment or internet banking adoption. Therefore, this paper proposes the following hypothesis:

H5a: Psychological risk positively affects perceived risk.

H5b: Financial risk positively affects perceived risk.

H5c: Privacy risk positively affects perceived risk.

2.2.2 Perceived Risk and Usage Intention

Luarn & Lin [48], Yang et al. [49] and Phonthanakitithaworn et al. [50] showed that when perceived risk is higher, the behavioral intention for mobile payment is relatively lower. Yang et al. [26] mentioned that because one's account and password may be stolen when connecting to the Internet and thus cause financial risk, perceived risk has a negative impact on behavior intention. Yang et al. [51] conducted an investigation of users who had used mobile payment, showing results that privacy negatively affects behavior intention. Previous studies have confirmed that perceived risk has negative impact on the adoption of mobile payment [2, 8, 13, 17, 29, 30, 34, 38, 52-54]. Thus, the following hypothesis is established:

H6: Perceived risk negatively affects adoption intention.

3. Research Method and Analysis Results

3.1 Data Collection

The primary subject of the analysis was users with actual experience using mobile payment services in Taiwan. The data for the study were collected through a web-based questionnaire. Data analysis was completed using statistical software packages including SPSS and PLS (Partial Least Squares). A pre-test and a pilot test are conducted to validate the measurement items. The pre-test involved seven participants (two professors in information management field and five mobile payment users), who are familiar with mobile payment services. They were asked to assess the terminology, clarity of instructions and eliminating redundant or unrelated items. The pilot test invited 65 respondents from the population of having usage experience users to participate, and several minor modifications of the content and structure of the items were solicited before the formal survey. By the time the survey was concluded, 602 valid questionnaires were collected for further analysis. Among these usable samples, 58.8% of the respondents were female, 41.26% were male, and at least 38.70% were students. A total of 44.85% of the respondents were between the ages of 16 and 25, and 57.97% had earned a bachelor's degree. A total of 40.50% of the respondents spent at least ten per year using mobile payment service, whereas 30.60% spent 1~3 times per year using mobile payment services. The ranks for paying by mobile payment service are "less than NT\$ 200" and "NT\$ 201 ~ 400", accounting for 34.92% and 25.56%. The respondents reported that QR code were the most frequently payment method (41.34%) items, and followed by NFC (38.16%).

3.2 Measurement Items

The respondents were requested to rate each item on a seven-point Likert scale, on which a score of 1 means *strongly disagree* and 7 means *strongly agree*. Appendix lists all of the questionnaire items. In order to evaluate construct reliability, we assessed the composite reliabilities (CR) of all constructs. In Table 1, the composite reliability values ranged from 0.895 to 0.953, exceeding the reliability criteria of 0.7; the average variance extracted (AVE) from all seven constructs ranged from the minimum of 0.670 to the maximum of 0.900; all exceeded the 0.5 critical values [55]. Moreover, the results presented in Table 2 demonstrate satisfactory discriminant validity, which means that all of the constructs differed from each other.

Table 1. Average Variance Extracted (AVE), Composite reliability, and Cronbach's α values for first-order constructs.

Constructs	AVE	Composite reliability	Cronbach's α
Perceived	0.682	0.895	0.847
Social Influence	0.670	0.910	0.878
Governmental	0.704	0.905	0.860
Additional Value	0.899	0.937	0.962
Usage Intention	0.900	0.937	0.963
Psychological Risk	0.700	0.903	0.856
Financial Risk	0.792	0.939	0.913
Privacy Risk	0.834	0.953	0.933

Table 2. Discriminant validity of measurement model.

	PTC	SI	GS	ADD_V	UI	PSY_R	FIN_R	PRIV_R
PTC	0.826							
SI	0.513	0.819						
GS	0.454	0.504	0.839					
ADD_V	0.449	0.468	0.543	0.948				
UI	0.576	0.578	0.672	0.651	0.949			
PSY_R	-0.206	-0.131	-0.200	-0.248	-0.338	0.834		
FIN_R	-0.178	-0.140	-0.221	-0.201	-0.328	0.690	0.890	
PRIV_R	-0.132	-0.189	-0.160	-0.116	-0.116	0.505	0.633	0.913

Note: Diagonal elements in the 'correlation of constructs' matrix are the square root of the average variance extracted (AVE); PTC = perceived transaction convenience; SI = social influence; GS = governmental support; ADD_V = additional value; UI = usage Intention; PR = perceived risk; PSY_R = psychological risk; FIN_R = financial risk; PRIV_R = privacy risk.

3.3 Hypotheses Testing Results

Table 3 and Figure 1 illustrate the standardized path coefficients between the constructs of the proposed model. All of the hypotheses were supported. The R^2 values of the endogenous constructs can be explained through the explanatory power of the proposed model. The explained variance is 65.3% for usage intention.

Table 3. Tests of Hypothesized Relationships.

Hypothesis	Path Coefficient	t-value	Decision
Perceived Transaction Convenience → Usage Intention	0.188**	3.033	H1 (supported)
Social Influence → Usage Intention	0.159**	3.134	H2 (supported)
Governmental Support → Usage Intention	0.314***	5.325	H3 (supported)
Additional Value → Usage Intention	0.288***	4.653	H4 (supported)
Psychological Risk → Perceived Risk	0.825***	37.492	H5a (supported)
Financial Risk → Perceived Risk	0.907***	80.594	H5b (supported)
Privacy Risk → Perceived Risk	0.810***	28.130	H5c (supported)
Perceived Risk → Usage Intention	-0.148***	4.539	H6 (supported)

Note. *** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$.

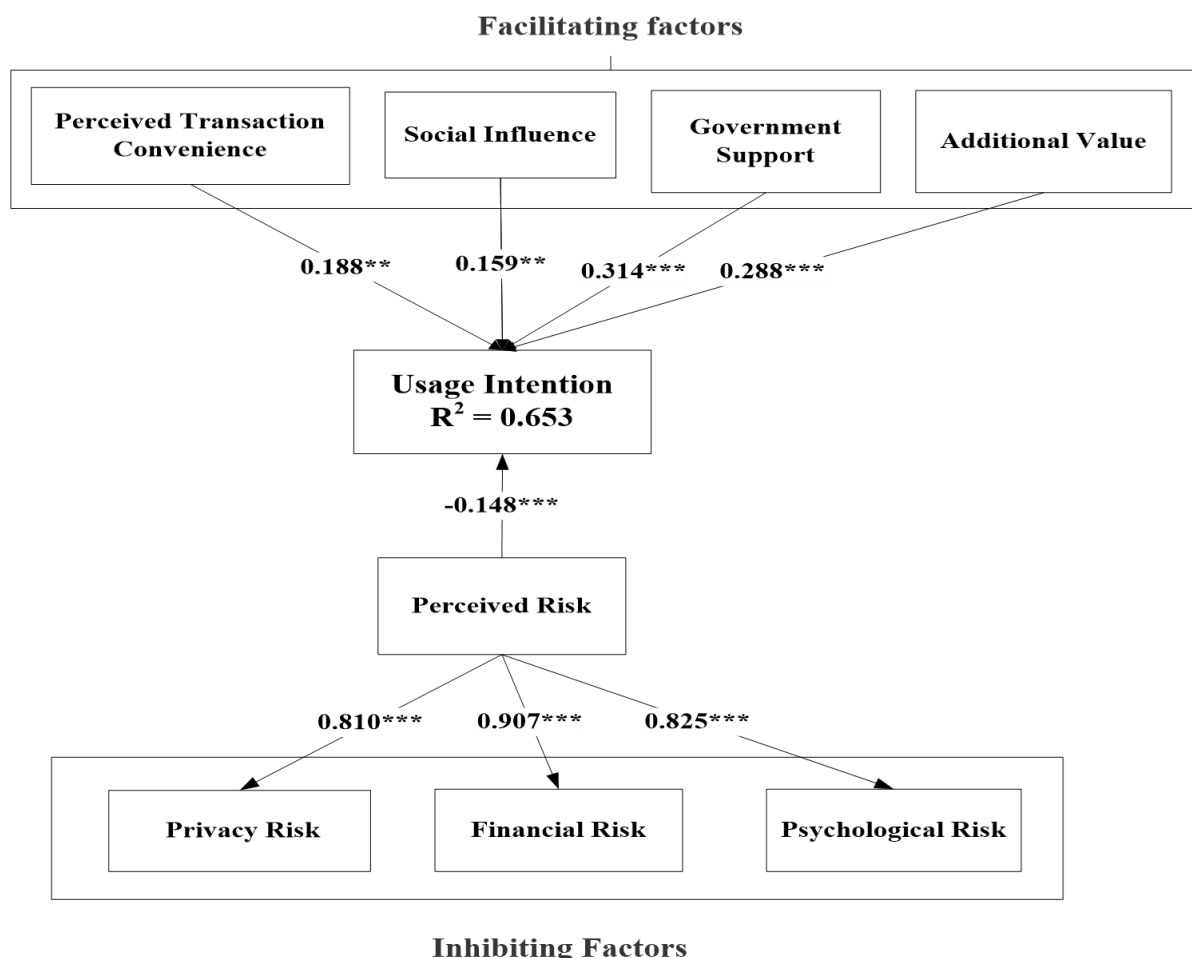


Figure 1. The results for hypothesis test. (** $P < 0.01$, * $P < 0.05$)

4. Conclusion and Discussion

4.1 Summary of Results

Based on the analysis results, it can be concluded that this study offers an appropriate research framework (including facilitating factors, inhibiting factors and usage intention) for investigating the intention to adopt mobile payment services in Taiwan. Several insightful findings are summarized, as follows:

4.1.1 Facilitating Factors

The results show that perceived transaction convenience, social influence, government support, and additional value have a positive impact on usage intention. Among them, government support is the most important factor among facilitating factors in affecting usage intention, which is consistent with the research results of Tan and Teo [56] and Zolait [57]. This implies that the government needs to play its role by establishing clear and solid laws for mobile payment to ensure that consumers are more confident in using mobile payment services, to improve the network infrastructure, and to help providers encourage users to utilize mobile payment systems.

Additional value is the second most important factor among facilitating factors to impact usage intention, meaning that users in Taiwan utilize mobile payment services because of rewards (e.g. coupons, discounts) and promotional offers, which is consistent with the results of Aydin and Burnaz [21] and Pham and Ho [38]. Therefore, it is suggested that retailers and enterprises that offer mobile payment methods should improve their incentive systems or increase discounts to enhance consumers' use of mobile payment services.

In addition, perceived transaction convenience is the third most important factor among facilitating factors in affecting usage intention, which is consistent with the results of Pham and Ho [38] and Kapoor et al. [58]. This implies that mobile payment service providers should help companies set up transaction locations and launch preferential activities. These measures can make consumers think it is convenient and be more willing to use mobile payment services.

4.1.2 Inhibiting Factor

The results show that perceived risk has a negative impact on usage intention, which is consistent with the results of Thakur & Srivastava [2], Merhi et al. [13], Baganzi and Lau [29], Pham and Ho [38] and Yang et al. [49]. This result showed that respondents who had used mobile payment services reduced the willingness to use mobile payment because they perceived the risk in it, whereby financial risk had the strongest relationship with perceived risk. Hence, mobile payment service providers need to emphasize that their services can make consumers obtain the effects they expect and no other additional financial loss will exist throughout the paying process. Through these efforts, it can reduce customers' fear about perceived risk and thus enhance usage intention.

4.2 Theoretical Implication

This study proposed a research framework to provide a profound understanding of the factors facilitating or impeding the adoption of mobile payments among Taiwan users; there are several implications for research emerging from this study. First, although the TAM/UTAUT/UTAUT2 have been intensively examined by the previous literatures on mobile payment services in Taiwan, little work has been done to combine other influencing factors (e.g. government support and additional value) in order to test their effects on the intention to use mobile payment services. This is because the consumer usage of mobile payment is a voluntary action and is often conducted solo; in this sense, the role of government support and additional value had been ignored in previous research of mobile payment usage intention.

Second, the government support was added as a new variable in the proposed framework; as our expectation that it have the largest effect on mobile payment usage. Our analytical results reveal that the importance of government support ($\beta = 0.314$; $t = 5.325$).

In addition, the second and third most important factors for influencing usage intention are additional value ($\beta = 0.288$; $t = 4.653$), and perceived transaction convenience ($\beta = 0.188$; $t = 3.033$). In other words, our study proposed a comprehensive framework to understand the willingness of consumers to adopt mobile payment service in Taiwan.

Finally, perceived risk (including financial risk, privacy risk and psychological risk) was taken into account to investigate the usage intention of consumers to use mobile payment services in our study. The study brings a comprehensive understanding about how to encourage mobile payment service usage. It provides a useful guideline to help researchers investigate issues related to mobile payment services.

4.3 Managerial Implication

According to the research results of this study, government support, additional value, and perceived transaction convenience are the top three most important facilitating factors that affect Taiwan users' usage of mobile payment services; therefore, it is suggested that enterprises/retailers operating mobile payment services can attract consumers by using these three aspects (e.g. government improve the network infrastructure and establishing clear and solid laws; mobile payment providers makes mobile payment transaction systems simpler and more convenient, and increase preferential activities and e-coupons), thereby increasing the number of users using mobile payment.

In addition, perceived risk is another challenging problem that impedes the process of adopting mobile payments services. As such, mobile payment providers and the government should make the necessary investment to ensure a stable and secure payment infrastructure and reduce financial loss and psychological anxiety. Minimizing the perceived risk (including financial risk, privacy risk and psychological risk) in the transaction process and providing authentication will attract more users' intentions to use mobile payment services.

4.4 Limitations and Future Research

Based on the results and conclusions of this study regarding the factors that affect the usage intention of mobile payment services, the following suggestions are put forward:

- (1) It is suggested that further discussion can be conducted regarding whether facilitating and inhibitor factors have significant impact on users in different demographics variables (e.g. gender, education, regions (e.g. urban and rural areas), and usage experience etc.).
- (2) In the future, we also plan to examine the applicability of the research model in different categories of user group (use and non-use of mobile payment services). We would like to investigate our research model in different user groups and make comparisons of users' willingness to use mobile payment services.

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Appendix. Summary of measurement items.

Construct	Measure
PTC= Perceived Transaction Convenience	
PTC1	Mobile payment is convenient because I can use it anytime.
PTC2	I believe that using m-Payment will be convenient.
PTC3	Compared to traditional payment methods, I believe that m-Payment methods are more convenient.
PTC4	Using M-coupon applications give me convenience to find needed coupons.
PTC5	I believe that using m-Payment will be hassle-free.
SI = social influence	
SI1	People who are important to me think that I should use mobile payment services.
SI2	People whose opinions that I value prefer that I use mobile payment.
SI3	People who I appreciate would encourage me to use mobile payment.
SI4	Friend's suggestions and recommendations will affect my decision to use mobile payment.
GS = governmental support	
GS1	The government is active in setting up the facilities to enable mobile payment.
GS2	The government is driving the development of mobile payment.
GS4	Government provide sufficient infrastructure.
GS5	For me, the promotion of the use of mobile payment by the government is important.
ADD_V = additional value	
ADD_V1	I will use mobile payment if I receive an incentive.
ADD_V2	I will use mobile payment if I receive a discount.
ADD_V3	Using mobile payment would help me easily keep up-to-date promotion of e-coupon.
ADD_V4	I like to benefit from promotions offered by the mobile payment.

PSY_R = Psychological Risk

PSY_R1 It would cause unnecessary tension, e.g., concerns about errors in operation.

PSY_R2 The thought of using mobile payment makes me anxious.

PSY_R3 The thought of using mobile payment causes me to experience unnecessary tension.

PSY_R4 I will feel stress while using mobile payment services.

FIN_R = Financial Risk

FIN_R1 A mistake when using the mobile payment may cause financial damage.

FIN_R2 Financial risk exists when using mobile payment.

FIN_R3 The use of mobile payment can cause financial risk.

FIN_R4 A mobile payment operation could lead to a surprising loss.

PRIV_R = Privacy Risk

PRIV_R1 The chance of using the mobile payment and losing control over the privacy of my payment information is high.

PRIV_R2 Personal information when using mobile payment may be stolen by others.

PRIV_R3 Personal information could be intercepted or accessed.

PRIV_R4 I think mobile payment service providers could provide my personal information to other companies without my consent.

UI = Usage Intention

UI1 I intend to use mobile payment in the future.

UI2 I predict I would use mobile payment in the future.

UI3 I will be likely to use mobile payment in the future.

UI4 I am willing to use mobile payment in the future.
