# From Traditional Payment Habit to Mobile Payment Habit: Examining the Mechanisms of Payment Habit Change

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## A B S T R A C T

In recent years, mobile payments gradually entered the lifestyles of consumers. For some economies, mobile payment service is exploding at an impressive rate. While for others, the adoption speed remains slow and most of the consumers are hesitating to continue using these mobile payment platforms after an initial try. We believe this is largely because of the presence of the entrenched traditional payment habits. Based on psychology theory of habit, this study focuses on the habit change from the traditional payment habit to the new mobile payment habit. It discusses how is mobile payment habit formed, and how does mobile payment habit nudge continuous use. Data are collected among 154 Hong Kong students. The data analysis results reveal that traditional payment habit, compatibility dimension of facilitating conditions, perceived usefulness and perceived enjoyment have significant influences on the formation of and change to mobile payment habit; mobile payment habit also has a significant impact on continuance use. However, satisfaction was not found to be influential in mobile payment habit formation. Our study highlights the importance of traditional psychology theory of habit in the area of mobile payment habit substitution. It also innovates in verifying the co-existence of traditional payment habit and mobile payment habit and understand the mechanism of which traditional payment habit influences mobile payment habit.

Keywords: Traditional Payment Habit, Mobile Payment Habit, Facilitating Conditions, Satisfaction, Continuance Mobile Payments Use

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# Ⅰ. Introduction

The concept of mobile payments was introduced and gradually taking root. Mobile payments were defined as "payments for goods, services and bills with a mobile device by taking advantage of wireless and other communication technologies (Dahlberg et al., 2015)." Typical mobile payments include Near Field Communication (NFC) based Apple pay and Samsung pay, and the Quick Response (QR) code encrypted Alipay, WeChat pay, and Line pay. In this research, we elaborate Hong Kong as an example of the relatively slow adoption case of mobile payments (Qi, 2018). Hong Kong mobile payment market shares common features with the rest of the emerging markets, it also carries some specialties. For example, compared with Mainland China, Hong Kong possesses a much more mature and reliable credit card system and financial infrastructure, which allow consumers to finish transactions safely via any point-of-sales machine (Soo, 2017a). The traditional payment methods such as cash, credit card and Octopus payment system were well entrenched in people's mind so that the new mobile payment methods can hardly find their position in Hongkongers' daily consumption habit. In other words, the traditional payment habit might be stronger among Hong Kong consumers than that in other places. For instance, in Mainland China people already jumped directly to the third generation of payment platform via mobile devices (Daxue Consulting, 2021).

There are three mobile payment categories: in-personal mobile payments, such as proximity payments; remote mobile payments; and peer-to-peer mobile payments (Abrams, 2017). This research sets it scope with the first category where consumers could use technologies such as NFC and QR code to conduct in-store transactions. Hong Kong has a relatively short mobile payment history. The first mobile payment platform – Tap & Go was launched in late 2015; and other NFC enabled payment options such as Apple Pay, Google Pay, Samsung Pay emerged quickly in 2016. With the entry of Alipay and WeChat pay in 2017, a mobile payments war among major operators heats up (Soo, 2017b). With the strong promotion incentives from the mobile payment providers (Bruinsma, 2018), early adopters began to use mobile payments more and more frequently in the past years. Recently, the new QR code payment system by AlipayHK was rolled out to 91 MTR stations across the city. However, Hongkongers do not seem to be excited on the idea of introducing mobile payments in MTR. Some Hongkongers interviewed feel the QR code payment method is somehow "additional" and "inconvenient", especially during the peak hours (Wei, 2021). These signs indicate Hong Kong market is still at the early stage of mobile payments adoption. We are not sure whether the initial adopters will continue using the new mobile payments and whether the early adopters will jump the chasm and effectively introduce the mobile payments to the mass (Rogers, 2003).

One of the major barriers of continuance mobile payments adoption may be the strong existing payment habit (Cai et al., 2019). The importance of habit toward continuous technology use was verified in previous works, e.g., Limayem et al., 2007; Venkatesh et al., 2012. Habit was defined as the extent to which people tend to perform behaviors automatically because of learning (Limayem et al., 2007); it was developed over a certain period, and slow to change (Wood and Neal, 2009). Here, we believe the co-existence of both old habit and new habit, as even after new habit has been learned, old memory traces are not necessarily replaced (Bouton et al., 2011). Back to practice, the traditional payment meth-

ods are familiar to the consumers and have the advantage of a well-established infrastructure. Consumers are more likely to repeat behaviors that are effortless and cognitively easier than other payment behaviors (Lankton et al., 2010). Therefore, this study specifically focuses on the perspectives of habit change and new mobile payment habit formation.

Literature has studied habit from multiple fields. In consumer behavior research, habit is a result of repetition (Orbell et al., 2001), and repetition is a central feature of consumer's daily life. Habit is also important in IS research, as users' automatic behaviors outside the task environment influence intention and behavior (Venkatesh et al., 2012). From psychology's perspective, habit is a special trait independent from goal and intention. Their studies have addressed issues of habit formation (Gardner and Lally, 2018) and habit change (Wood and Rünger, 2016).

In this study, we borrow the concepts of habit change and habit formation from psychology theory of habit. The process of habit change overlaps with the process of new habit formation, as habit formation is more realistically depicted as substitution of a "bad" habit with a "good" habit, if it gets involved with behavioral change (Gardner and Lally, 2018). It is a slow decaying process of the unwanted old habit, and the development of new, stronger habit associations for the wanted new habit. Therefore, we will examine these two processes simultaneously. There are three methods to change habit: exerting self-control, implementation intentions and changing cues (Wood and Neal, 2009). The first two are, however, less powerful than changing cues in explaining habit change (Verplanken and Wood, 2006). Therefore, in the present study, we intend to emphasize the power of facilitating condition, as the contextual cue in influencing the conversion from the traditional habit to the mobile payment habit. As to habit for-

mation, Wood and Rünger (2016) introduced two mechanisms of habit learning: associative and reward mechanisms. The associative mechanism is a context-response association, where contextual cues (facilitating conditions) trigger a memory representation of habitual response. Reward mechanism means the benefits individual perceives when repeating a certain behavior. In this case, when consumers feel the mobile payments rewarding (perceived usefulness and enjoyment), they tend to repeat the habit in the future. In addition, habit change is also influenced by feedback and affect, where feedback is defined as intentional delivery of information about performance or behaviour to facilitate habit change (Hermsen et al., 2016), and affect refers to the positive feeling and intrinsic rewarding outcome of habit change (Weyland et al., 2020). Both are believed to be successful motivators of behaviour. Satisfaction can be treated as both feedback and an affective status of using mobile payments, thereby, it is theorized as a disrupter of the old habit and activator of new habit.

Motivated by mobile payment practices and the psychology theory of habit, the research questions are summarized as follows: 1) How does habit change from traditional payment to mobile payment? 2) How do facilitating conditions, perceived usefulness, perceived enjoyment, and satisfaction influence mobile payment habit? 3) How does mobile payment habit affect consumers' continuance use of mobile payments?

The paper begins with a summary of literature on habit theory and mobile payment habit in IS research. Then, we present a research model in the mobile payments context. This is followed by the introduction of research methodology, and data analysis. Lastly, we discuss the research results, implications, and give suggestions for future research.

## Ⅱ. Literature Review

In the literature review, we will firstly introduce the psychology theory of habit, and then elaborate prior IS literature on habit and mobile payment habit.

### 2.1. Habit as a Learned Automatic Response

The definition of habit remains a controversial issue (Fleetwood, 2021). Previous scholars have treated habit as a cognitive representation (Robbins and Costa, 2017), a mechanism (Mazar and Wood, 2018), a form of automaticity (Orbell and Verplanken, 2010), or a psychological disposition (Neal et al., 2012). Based on psychology theory of habit, habit is a learned automatic response – it is a memory-based propensity to respond automatically to contextual cues (Mazar and Wood, 2018). The contextual cues include physical environment, specific type of people or actions (Wood and Rünger, 2016). Habit could be activated when the memory representation is created with repeated occurrence of contextual cues and behaviors. The more often a behavior is performed under a certain context, the richer the memory representation is created (Wood and Rünger, 2016). In the present study, we address the habit issues from two well-documented perspectives: habit change (Wood and Rünger, 2016) and habit formation (Gardner and Lally, 2018).

### 2.2. Habit Change-from Traditional Payment Habit to Mobile Payment Habit

Behavior change cannot be isolated with existing actions. Habit change should be seen as a process consisting of habit substitution, a transition from an old to a new habitual response (Gardner and Lally, 2018). However, there is a serious paucity of research examining how the existing habits affect the establishment of new habits.

There are three methods to change/substitute habit: exerting self-control, implementation intentions and changing cues (Wood and Neal, 2009). Self-control is a general ability to regulate behavior to achieve valued goals (Tangney et al., 2018). Perceived behavioral control is one dimension of facilitating conditions in Venkatesh (2003)'s work, therefore we predicted that perceived behavioral control is effective in habit substitution.

In addition, as self-monitoring is another dimension of self-control (Wood and Neal, 2009), satisfaction as a way of self-monitoring is also related to habit change. To ensure the success of self-monitoring, information from external sources, such as feedback is provided to facilitate behavior change (Van et al., 1997). Meanwhile, affect may lead to more frequently performed behavior and sustained motivation in developing habit, indicating a high implementation intention of habit (Weyland et al., 2020). Based on these two explanations, we introduce satisfaction as one method of self-control and it is a reflection of feedback and affect (Weyland et al., 2020).

Contextual cues are one type of cues in habit change, previous findings have suggested that contextual cues are key to habit substitution (Verhoeven et al., 2014). Contextual cues is a powerful ally in changing habits because they free people to establish new patterns of behavior (Verplanken and Wood, 2006). In the current study, facilitating conditions are treated as important contextual cues to facilitate habit change. They may include resources and supports from technology, vendor, people, and self. Consumers might change their habitual behavior when the QR code and NFC reader are presented, help or instructions are provided, or the purchase

behavior is consistent with their prior knowledge or experience.

Reward cues are another type of cues to promote the repetition of new and desired habit (Anderson and Wood, 2020). The perception of reward cues automatically motivates repeated response. If the reward cues can be predicted to be positive consistently, one is more likely to repeat the behavior, and gradually learn it as a habit with gradual changes of biological reactions (Balleine and O'Doherty, 2010). It should be noted that reward cues can be in various forms (Anderson and Wood, 2020). Perceived usefulness and enjoyment are utilitarian and hedonic rewards mobile payments can bring to habit change.

## 2.3. Habit Formation - The Associative and Rewarding Mechanisms

There are two mechanisms to form a new habit: associative and rewarding mechanisms (Wood and Neal, 2009; Giesen et al., 2020). In the associative mechanism, one's cognitive structures are changed incrementally with the repeated performance of habit response under the relevant contextual cues, and consequently, form the rich memory representation of the habit (Wood and Neal, 2009). Contextual cues can be very diversified, such as the external environment, people, or one's actions. Facilitating conditions are one type of contextual cues.

As to the rewarding mechanism, a habit is strengthened as people repeat behaviors that are perceived to be rewarding: people tend to conduct a behavior at a repetitive basis depending on how positive the outcome of the behavior is (Wood and Neal, 2009). Both extrinsic and intrinsic rewards are effective in leading repeated behavior (Carden and Wood, 2018). Mobile payments, enabled by the information technology, may bring intrinsic motivations, such as utili-

tarian and hedonic benefits as rewards of use (Venkatesh et al., 2003). Satisfaction as an intrinsic affect and positive feedback is also a reward of using mobile payments. Therefore, we believe perceived usefulness, enjoyment and satisfaction are significant rewarding mechanisms in the present study.

In sum, from the perspective of psychology theory of habit, facilitating conditions, perceived usefulness, perceived enjoyment and satisfaction are all important determinants of habit formation, and facilitators of habit change. They were therefore included in the present study.

## 2.4. Habit in Information Systems (IS) Research and Mobile Payment Habit

### 2.4.1. Habit in IS Research

Prior IS research has discussed both antecedents and consequences of habit. For the antecedents, based on a comprehensive review of previous habit literature, Limayem et al. (2007) summarized that frequency of behavior, satisfactory outcome, stable context and comprehensiveness of usage help with habit development. Lankton et al. (2010) found prior IS use, satisfaction, and attention importance significantly influenced IS habit. Jia et al. (2014) revealed that habits formed from past experiences in using other mobile related services. Last, Chen et al. (2020)'s results showed that perceived usefulness, enjoyment, and sense of belonging contribute to habit formation and satisfaction. In this research, we adopt perceived usefulness, enjoyment, and satisfaction as three antecedents of mobile payment habit.

As to the consequences of habit, most of the IS researchers discussed the influence of habit on intention and behavior. Firstly, they proposed that habit is a concept independent from intention. This can

be explained by the dual-process theory. In the theory, two different systems of thoughts co-exist: a quick, automatic, associative, and affective-based form of reasoning, and a slow, thoughtful, deliberative process (Sloman, 2014). Based on the dual-process theory, people's decision making is constrained by limited capacity of working memory. People may either respond automatically (where habit applies) or go with deliberate information process (where behavioral intention is initiated) (Evans and Stanovich, 2013). In the IS literature, habit was validated as a predictor of behavioral intention (Venkatesh et al., 2012) and continuous use of information systems (Lankton et al., 2010). Secondly, there is still another branch of research that found habit to negatively moderate the relationship between intention and continuance behavior (Lin et al., 2017). In this study, we would like to further explore the consequences of mobile payment habit, particularly the influence on continuous use.

Based on the above discussions, it could be seen that habit has long been confined as a predictor of behavioral intention and continuous use of information systems in the IS literature. However, how habit was formed and changed was rarely studied. In the past, it has been overlooked that old habit and new habit may coexist, even after new habits were learned, old memory traces are not necessarily replaced (Bouton et al., 2011). Thus, it is imperative to take the coexistence of both habits into consideration (Sheth, 2020). We believe there is an overlapping area between habit change and habit formation. The process of habit change, from the old habit to the new habit is also the process of new habit formation. The literature in this direction has devoted to address this issue. For instance, Polites and Karahanna (2013) provided a theoretical understanding of how incumbent system habits can be disrupted, and how the development of new system habits can be encouraged within the context of organizational and individual work routines. However, given its focus on IS habits in working routines, whether or not an individual habitually selects the system in other situations should be examined further (Polites and Karahanna, 2013). The disruption mechanism of incumbent habits and the formation mechanism of new habits need in-depth discussion as well. In summary, this study extends the traditional IS adoption models, and investigates the changing and formation mechanisms of new habit in the context of mobile payments.

### 2.4.2. Mobile Payment Habit

Most of the previous analysis on the mobile payments fell into three categories: mobile payment ecosystems, technology and technological environment, and consumer adoption, very limited attention was paid to mobile payment habit. For example, Dahlberg and Oorni (2007) first introduced the concept of payment habit. They compared the choice of 11 payment habits at different scenarios, however, the observations are not tailor made to the mobile payment environment. Later, Jia et al. (2014) introduced learning transfer theory and examined how technology use habits affect consumers' intention to continue using mobile payments. They touched the interference between different habits, while the alternation and change of habits were ignored. Similarly, Morosan and DeFranco (2016) built a comprehensive model that explained intention to use NFC mobile payments in hotels. Performance expectancy, social influence, facilitating conditions, hedonic motivations, and habit are significant motivators of intention. Again, this empirical research did not investigate the mechanism on how habit is formed.

### 2.4.3. Facilitating Conditions

Facilitating condition was defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system in the organizational settings (Venkatesh et al., 2003). Venkatesh et al. (2003) comprehensively summarized the root constructs of facilitating conditions. They are perceived behavioural control, compatibility and facilitating conditions. Each of these constructs is operationalized to include aspects that are designed to remove barriers to use the system. However, the follow-up studies (e.g., Hong et al., 2011; Macedo, 2017) related to facilitating conditions have largely treated facilitating conditions as one reflective construct, without distinguishing the differences between the three sub-dimensions. As mobile payment situation varies across different countries, in the present study, it is practically meaningful to investigate the effect of each individual dimension of facilitating conditions on habit formation and habit change.

### 2.4.4. Satisfaction

Satisfaction has been documented in the IS post adoption literature to play an important role in the formation (Lankton et al., 2010) and development of habit (Limayem et al., 2007). People tend to reproduce or reconduct a behavior if satisfactory feelings are obtained (Lankton et al., 2010). In recent work on mobile payment habit, Handarkho et al. (2021) found that satisfaction is the most substantial direct influence on the establishment of habit to use mobile payments. They believed that satisfaction is an attitude that leads to loyalty in using certain service, and this loyalty stimulates continuous use for the habit development. From the perspective of psychology theory of habit, satisfaction is also treated as a feedback, affect and intrinsic reward mechanism. We believe satisfaction is highly related to the mobile payment habit formation and continuous use in the current research, therefore, it is added as the fourth antecedent of mobile payment habit.

As psychology theory of habit is the major theoretical lens to investigate mobile payment habit, and IS research related to habit is largely evolved from this theory, we would like to summarize the relationship between the theory and constructs in <Table 1>.

<Table 1> Relationship between Theory and Constructs

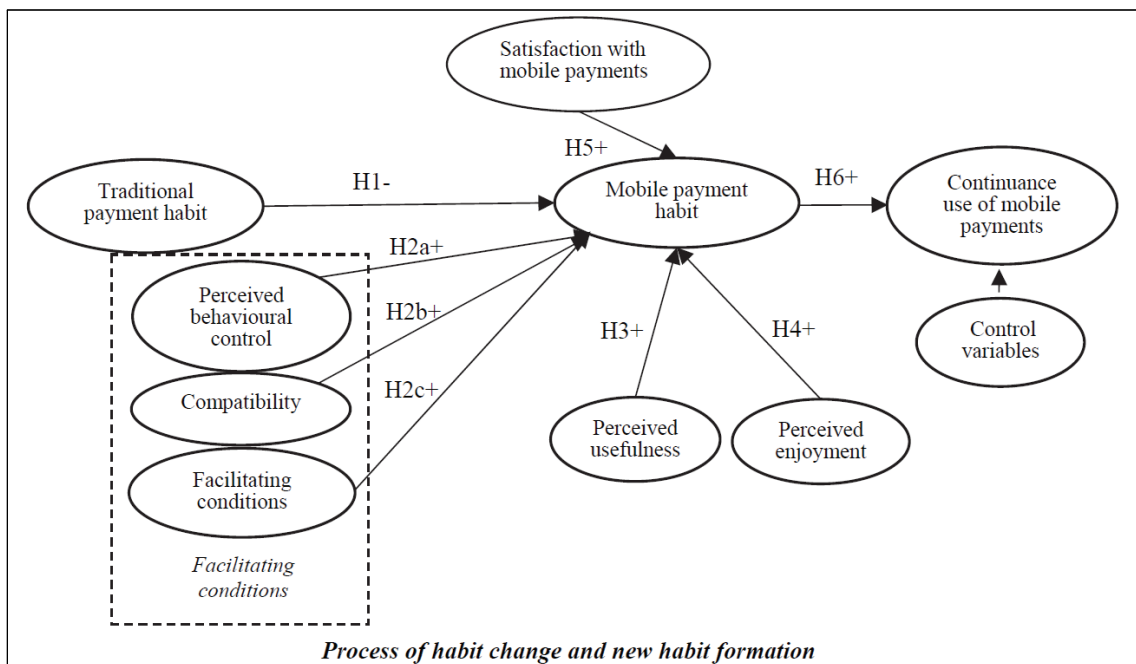| Theory | Habit Stage | Explanations | Constructs |
|---|---|---|---|
| Psychology Theory of Habit | The overlapping stage of habit change and new habit formation | • Co-existence of traditional payment habit and mobile payment habit<br>• Habit formation and change may happen simultaneously | Traditional payment habit Mobile payment habit |
| | | • Contextual cues of habit change<br>• Associative mechanism of habit formation | Facilitating conditions |
| | | • Reward cues of habit change<br>• Rewarding mechanisms (utilitarian and hedonic benefits) to stimulate habit formation.<br>• Habit research in IS literature | Perceived usefulness Perceived enjoyment |
| | | • Self-control, monitoring and feedback in habit change<br>• Affect and intrinsic reward in habit formation<br>• Habit research in IS literature | Satisfaction |

Based on the above discussions, there are several gaps in the literature. First, there is a lack of study in IS literature to comprehensively examine the change and formation mechanisms of habit, and the use of appropriate habit theory to explain the above-mentioned phenomenon. Second, there is a significant shortage of mobile payment habit studies in IS research. Third, the context-specific predictors of mobile payment habit remain largely unknown. The present study tries to fill in the above research gaps.

## Ⅲ. Research Model and Hypotheses

<Figure 1> presents the research model proposed in this study. There are totally 8 hypotheses, among which, H2 contains 3 sub-hypotheses. The definitions of all constructs in the model are shown in <Table 2>. The control variables are age, gender, mobile device use history, frequency of using mobile payments, and average spending on mobile payments.

Traditional payment, such as cash and credit cards, has been the dominant payment methods in different transactional situations before mobile payments are available. Therefore, using traditional payment can be considered as old, alternative habitual responses during the transactions. When an individual has a strong habit of traditional payment, he or she has formed a strong memory representation of using traditional payment during transactions. The stronger the traditional payment is as a habit, the more vivid and easier such memory representation of traditional payments is recalled by consumers. Given the limited information processing capacity (Wood and Rünger, 2016), such persistent recalling activates the



<Figure 1> Research Model

<Table 2> Definitions of Constructs in the Research Model

| Constructs | | Definitions | References |
|---|---|---|---|
| Traditional Payment Habit | | The extent to which using traditional payments during transactions is an automatic response to an individual. | Limayem et al. (2007) |
| Mobile Payment Habit | | The extent to which using mobile payments during transactions is an automatic response to an individual. | Limayem et al. (2007) |
| Facilitating Conditions | Perceived Behavioral Control | Perceptions of internal and external constraints on behavior and encompasses self-efficacy, resource facilitating conditions, and technology facilitating conditions. | Venkatesh et al. (2003) |
| | Compatibility | The degree to which mobile payments are perceived as being consistent with existing values, needs, and experiences of potential adopters. | |
| | Facilitating Conditions | Objective factors in the mobile payment environment that users agree to make an act easy to do, including the provision of technological support. | |
| Perceived Usefulness | | The degree to which an individual believes that using mobile payments during transactions enhance his or her payment performance. | Davis et al. (1989) |
| Perceived Enjoyment | | The extent to which using mobile payments during transactions evokes the feeling of joy, pleasure, and playfulness. | Shang and Wu (2017) |
| Satisfaction with Mobile Payments | | Mobile payment users' affect with and feelings about prior mobile payments use. | Bhattacherjee (2001) |
| Continuance Use of Mobile Payments | | An individual's use of mobile payments on a continued basis. | Limayem et al. (2007) |

responses related to using traditional payment during transactions. Thus, the frequency of activating mobile payments is reduced by the frequent activation of traditional payment, and consumers are less likely to form mobile payment habit. Researchers like Polites and Karahanna (2012) have also investigated how incumbent system habits inhibit adoption and use of new systems. Based on the above discussions, we propose that:

*H1: Traditional payment habit is negatively related with mobile payment habit.*

Facilitating conditions of mobile payments refer to the availability of the resources and supports as perceived by individual consumers when using mo-

bile payments for in-store transactions (Venkatesh et al., 2003). In general, facilitating conditions are treated as relevant contextual cues, and contextual cues may activate people to trigger their automatic responses (Wood and Rünger, 2016). Therefore, facilitating conditions as a big category is positively associated with mobile payment habit. As facilitating conditions are consistent of three sub-dimensions: perceived behavioural control, compatibility, and facilitating conditions, the relationships between the three sub-dimensions and mobile payment habit are discussed separately.

First, perceived behavioral control originates from the theory of planned behaviour (TPB), it reflects the personal perception of the ease or difficulty in carrying out a particular behavior (Ajzen, 2005).

Research has shown that a strong level of perceived behavioral control makes the behaviour easier to perform, thus allowing habit to facilitate the behavior (Kaushal et al., 2020). In other words, due to the dual process theory, habit is predictable and performed with more ease, thus, habitual behaviors are more likely to happen with perceptions that reflect familiarity and fluency, or a high perceived behavioral control.

Second, the compatibility construct comes from Innovation Diffusion Theory (IDT), it is defined as the perceived level of consistency an innovation has with one's own values, needs, and past experiences (Moore and Benbasat, 1991). On one hand, the readiness and fitness of mobile payments to better serve the customers' needs is a factor to release customers' concerns toward its use (Humbani and Wiese, 2019). On the other hand, compatibility with prior experience implies that one has the right mental cognitive schemas to rapidly use the technology, and the cognitive efforts in adoption is dramatically reduced (Karahanna et al., 2006). Customers are thus easier to repeat the behavior and form new habit.

Third, facilitating conditions mainly related to the objective factors, such as environmental barriers or availability of resources that consumers may perceive when using mobile payments. Guidance, specialized instruction, and people are all objective factors and contextual cues to trigger automatic response. Based on learning mechanism of habit (Wood and Rünger, 2016), when consumers are repeatedly exposed to the contextual cues enabling mobile payments, they gradually learn the association between the transaction contextual cues and mobile payments. Thereby, when the facilitating conditions are high, consumers are more likely to notice the relevant contextual cues and to use the mobile payments as a habitual response. We therefore propose the below three hypotheses.

*H2a: Perceived behavioural control dimension of facilitating conditions is positively related with mobile payment habit.*

*H2b: Compatibility dimension of facilitating conditions is positively related with mobile payment habit.*

*H2c: Facilitating conditions dimension of facilitating conditions is positively related with mobile payment habit.*

Perceived usefulness of mobile payments reflects the extent to which using mobile payments can enhance users' payment performance. Mobile payments not only facilitate monetary exchange between consumers and vendors by providing technological functions but also bring consumers additional monetary rewards. According to habit change and formation theory, people are inclined to form habit based on the repetition of rewarded behaviors (Thorndike, 1898). Since positive experience could serve as rewards for consumers' use of mobile payments, the higher consumers perceive the usefulness and utilitarian value of mobile payments, the more likely they are going to form mobile payment habit. Therefore, we propose that:

*H3: Perceived usefulness of mobile payments is positively related with mobile payment habit.*

Perceived enjoyment of mobile payments refers to users' feeling of joy, pleasure and playfulness that is evoked when making the payment. From a neural perspective of habit, the reinforcement process of forming a habit depends on the midbrain dopamine systems. Enjoyment, as a positive emotional state with increased dopamine response, can activate the

reinforcement process at a neural level (Balleine and O'Doherty, 2010). The stronger people perceive for the positive experience of using mobile payments, the better the reinforcement system activates the rewarding mechanism in habit formation and change. What is more, perceived enjoyment is also one type of positive affect, and affect plays an important role in habit formation (Weyland et al., 2020). Therefore, we propose that:

*H4: Perceived enjoyment of mobile payments is positively related with mobile payment habit.*

Satisfaction was initially defined in the context of job performance as a pleasurable or positive emotional state resulting from the appraisal of one's job. In IS research, Bhattacherjee (2001) believed satisfaction is a psychological or affective state related to and resulting from a cognitive appraisal of the expectation performance discrepancy (confirmation). From both definitions, we can see satisfaction gets involved with affective status, feelings, and feedbacks for initial expectations. This concept is further confirmed by recent habit theories where satisfaction is treated as both feedback (Hermsen et al., 2016) and an affective status (Weyland et al., 2020) to enable habit formation and change. From the perspective of feedback, Hermsen et al. (2016) claimed that feedback interventions are not only capable of disrupting undesirable habits, but can also play a significant role in changing habit behavior. With respect of affect or intrinsic reward, Weyland et al. (2020) concluded that when the affective response to a cue-response situation is pleasurable or satisfied, a learned association between stimulus and response will be informed, and thus new habit is formed. Prior IS habit research like Limayem et al. (2007) and Lankton et al. (2010) also confirmed the positive relationship between sat-

isfaction and habit. Based on these, we believe satisfaction is a significant enabler of the new mobile payment habit.

*H5: Satisfaction with mobile payments is positively related with mobile payment habit.*

The post IS adoption model proposed that habit would influence continued IS use more as behavior becomes less reflective (Lankton et al., 2010). Continuous IS use frequency may increase because habitual behaviors are cognitively easier and faster to process than behaviors that require more reflective processing. Therefore, when the mobile payment habit is formed, people tend to have more continuance use of mobile payment services due to an automatic response during transactions. Literature on this stream has also proved the existence of the path between habit and continuous use (Limayem et al., 2007). Based on this, we propose that:

*H6: Mobile payment habit is positively related with continuance use of mobile payments.*

## Ⅳ. Research Methodology

### 4.1. Measures

<Table 3> summarizes all the measures of constructs and the sources. All the constructs were reflective variables.

#### 4.1.1. Payment Habits

We refer to the classical measures of habit in IS literature (Limayem et al., 2007) and measure both traditional payment and mobile payment habits by

using six items per each. The measurements of the habit construct were adapted from the self-report habit index (Verplanken and Wood, 2006), which reflected the conception of habit as a form of automaticity.

### 4.1.2. Facilitating Conditions

In Venkatesh et al. (2003), facilitating conditions were studied in a context of organization, when employees need to learn and adopt new information technologies. It is embodied by three dimensional constructs: perceived behavioural control, facilitating conditions and compatibility. These constructs were operationalized to include technological and/or organizational environment that are designed to remove barriers to use. Similar with Venkatesh et al. (2012), we adjusted these items to guarantee they are suitable in measuring facilitating conditions in consumers' use of information technology, and mobile payments in particular. In <Table 3>, items 1 and 2 were used to measure perceived behavioural control, items 3 and 4 were for compatibility, and items 5-7 facilitating conditions. As we would like to emphasize the effect of each facilitating condition in this research, facilitating conditions are divided into three reflective constructs.

### 4.1.3. Perceived Usefulness and Perceived Enjoyment

Perceived usefulness items were adapted from Davis et al. (1989)' s four-item perceived usefulness scale. The first three items tap into the performance, productivity, and effectiveness dimensions of mobile payments usage, while the last one assesses overall usefulness. The original source of perceived enjoyment came from Davis et al. (1992). It represents an intrinsic type of motivation. Four items were used

to measure this construct.

### 4.1.4. Satisfaction with Mobile Payments

This construct captures respondents' satisfaction level with mobile payments in the past and is anchored between four semantic differential adjective pairs: "dissatisfied/satisfied", "displeased/pleased", "frustrated/contented", and "terrible/delighted" (Bhattacherjee, 2001). This measure has been widely adopted in post IS adoption research. To make it consistent with the rest of measures, we used five-point Likert scale to measure satisfaction.

### 4.1.5 Continuance Use of Mobile Payments

We adapted Limayem et al. (2007) and Venkatesh et al. (2008)'s approaches to measure continuance use. Since it would be irrelevant to measure the duration of mobile payments, we used total number of mobile payment transactions (how many) to replace duration. We kept the frequency measure - "how often did you use mobile payments" and added another frequency measure to ask the percentage of mobile payments out of total payments. To capture the nature of intensity of usage, we followed Venkatesh et al. (2008) and Rao et al. (2007), with a purpose to reflect the overall extent of mobile payments use. Overall, four items were used to measure continuance use of mobile payments.

## 4.2. Data Collection

To test the research model, similar with Limayem and Cheung (2008), this study conducted two rounds of cross-sectional surveys. The participants are undergraduate students from a public university in Hong Kong. To avoid common method bias, we separated

<Table 3> Table of Measures

| Constructs | Measures | | References |
|---|---|---|---|
| Traditional Payment Habit (Reflective) | 1. Using traditional payment methods has become automatic to me.<br>2. Using traditional payment methods is natural to me.<br>3. When faced with a particular payment task, using traditional payment methods is an obvious choice for me.<br>4. I use traditional payment methods as a matter of habit.<br>5. Using traditional payment methods has become a habit to me.<br>6. It is a habit of mine to use traditional payment methods. | | Limayem et al. (2007) |
| Facilitating Conditions | Perceived behavioral control (reflective) | 1. I have the resources necessary to use mobile payments.<br>2. I have the knowledge necessary to use mobile payments. | Venkatesh et al. (2003) |
| | Compatibility (reflective) | 3. Mobile payments are compatible with other payment methods I use for in-store transaction.<br>4. Using mobile payments fits well with the way I usually pay the in-store transactions. | |
| | Facilitating conditions (reflective) | 5. Guidance is available to me in mobile payments.<br>6. Specialized instruction concerning mobile payments was available to me.<br>7. A specific person (or group) is available for assistance with mobile payments difficulties. | |
| Perceived Usefulness (Reflective) | 1. Using mobile payments improves my performance in in-store transactions.<br>2. Using mobile payments in in-store transactions increases my productivity.<br>3. Using mobile payments enhances my effectiveness in in-store transactions.<br>4. Overall, mobile payments are useful in paying for in-store transactions. | | Davis et al. (1989) |
| Perceived Enjoyment (Reflective) | 1. Using mobile payments is pleasant to me.<br>2. Using mobile payments is enjoyable to me.<br>3. I have fun using mobile payments.<br>4. I find using mobile payments to be interesting. | | Davis et al. (1992) |
| Mobile Payments Habit (Reflective) | 1. Using mobile payments has become automatic to me.<br>2. Using mobile payments is natural to me.<br>3. When faced with a particular payment task, using mobile payments is an obvious choice for me.<br>4. I use mobile payments as a matter of habit.<br>5. Using mobile payments has become a habit to me.<br>6. It is a habit of mine to use mobile payments. | | Limayem et al. (2007) |
| Satisfaction with Mobile Payments | How do you feel about your overall experience of mobile payments use?<br>1. 1 = Dissatisfied; 5 = Satisfied<br>2. 1 = Displeased; 5 = Pleased<br>3. 1 = Frustrated; 5 = Contented<br>4. 1 = Terrible; 5 = Delighted | | Bhattacherjee (2001) |
| Continuance Use of Mobile Payments (Reflective) | 1. In the past two months, how often did you use mobile payments for in-store transactions?<br>2. In the past two months, how many in-store transactions were made by using mobile payments?<br>3. In the past two months, how many percent of in-store transactions were made through mobile payments?<br>4. Overall, please describe the extent of your mobile payments usage in the past two months. | | Limayem et al. (2007); Venkatesh et al. (2008) |

the collection of independent and dependent variables by time, so that data on continuance use of mobile payments were collected in the second round (after two months of the first round). In the first round, 404 online survey requests were sent to the students who took the same subject in a semester. After two rounds of solicitation, a total of 381 students responded to the survey representing a response rate of around 94%. Among them, 145 responds never used mobile payments before were discarded. 26 more incomplete data were deleted. This made the final data set of round one 210. In the second round, we sent the questionnaires to these 210 respondents. A unique token was used to cross-check the identity of the students in both rounds. 154 completed data were collected at the end, this represents the students who have used mobile payments before in the first round and have successfully completed the second round of survey. Non-response bias was checked by comparing the early and late waves of respondents of both rounds (Kim et al., 2010) in terms of their differences on two important demographics - age and gender. For both rounds, the chi-square test results are both insignificant for age (round one:

0.356; round two: 0.252) and gender (round one: 0.833; round two: 1.000). As to common method bias, first, we have used multiple sources of data to avoid common method bias. In addition, we conducted Harman's one-factor test (Podsakoff et al., 2003) by using principal component analysis of all the items employed in the study. Six factors emerged with eigenvalues greater than 1, with the first factor accounting for only 36.5 percent of the explained variance. This further confirmed common method bias is not a cause of concern in our sample.

The profile information of the respondents is shown in <Table 4>. From <Table 4>, we can see that most of the survey participants were female students with an age range 18 to 21; and the traditional payment methods go with cash (91.6%) and Octopus card (72.7%). For those who used mobile payments before, the most frequently used mobile applications are Alipay (44.1%) and Wechat Pay (29.2%). Over 60% of the respondents used mobile payments at least once a month, and their average spending was usually within 100 HKD. At last, 47.4% of the respondents are Hong Kong local people.

<Table 4> Profile Information of the Respondents

| | Category | Frequency | Total (%) |
|---|---|---|---|
| Gender | Male | 59 | 38.3% |
| | Female | 95 | 61.7% |
| Age | 16-17 | 2 | 1.2% |
| | 18-19 | 114 | 74.0% |
| | 20-21 | 34 | 22.0% |
| | 22-23 | 3 | 1.9% |
| | 24 or above | 1 | 0.6% |
| Traditional Mobile Payment Methods | Cash | 141 | 91.6% |
| | Credit Card | 53 | 34.4% |
| | Octopus Card | 112 | 72.7% |
| | Debit Card | 33 | 61.1% |

<Table 4> Profile Information of the Respondents (Cont.)

| | Category | Frequency | Total (%) |
|---|---|---|---|
| Most Used Mobile Payment Platform | O! ePay | 1 | 0.6% |
| | Wechat Pay | 45 | 29.2% |
| | Ali Pay | 68 | 44.1% |
| | Apple Pay | 23 | 14.9% |
| | Google Pay | 5 | 3.2% |
| | Tap & Go | 12 | 7.8% |
| Frequency of Using Mobile Payments | Never | 6 | 3.9% |
| | 1 to 3 times a month | 63 | 40.9% |
| | 1 to 3 times a week | 35 | 22.7% |
| | 4 to 6 times a week | 19 | 12.3% |
| | 7 to 10 times a week | 17 | 11.0% |
| | More than 10 times a week | 14 | 9.1% |
| Average Spending on Mobile Payments | 0 - 50 HKD | 35 | 22.7% |
| | 51-100 HKD | 47 | 30.5% |
| | 101-200 HKD | 24 | 15.6% |
| | 201 - 500 HKD | 23 | 14.9% |
| | 501 - 1000 HKD | 10 | 6.5% |
| | 1001 - 2000 HKD | 5 | 3.2% |
| | 2001 HKD or above | 10 | 6.5% |
| Mobile Device Use History | 1-3 years | 52 | 33.8% |
| | 4-6 years | 49 | 31.8% |
| | 7-10 years | 38 | 24.7% |
| | More than 10 years | 15 | 9.7% |
| Hong Kong Local People? | Yes | 73 | 47.4% |
| | No | 81 | 52.6% |

# Ⅴ. Data Analysis

SmartPLS (v. 3.3.6) (Ringle et al., 2015) was used as the statistical software to test the theoretical model. It was applied to examine the measurement model and the structural model at the same time.

## 5.1. Measurement Model

PLS algorism was run to test the convergent validity and discriminant validity of the constructs. The convergent validity was examined by checking the composite reliability and Average Variance Extracted (AVE) from the measures (Hair et al., 1998). <Table 5> shows that all the composite reliabilities are above the threshold of 0.707 (Chin, 1998), and all the AVEs pass the recommended value of 0.5 (Fornell and Larcker, 1981). To verify the discriminant validity, the squared roots of the AVEs were used to compare with the correlations between constructs (Fornell and

<Table 5> Reliability and AVEs

| Measures | | Items | Composite Reliability | AVE |
|---|---|---|---|---|
| Traditional Payment Habit | | 6 | 0.963 | 0.814 |
| Facilitating Conditions | FC1-Perceived behavioural control | 2 | 0.877 | 0.782 |
| | FC2-Compatibility | 2 | 0.842 | 0.731 |
| | FC3-Facilitating conditions | 3 | 0.825 | 0.620 |
| Perceived Usefulness | | 4 | 0.922 | 0.746 |
| Perceived Enjoyment | | 4 | 0.955 | 0.840 |
| Mobile Payment Habit | | 6 | 0.960 | 0.801 |
| Satisfaction with Mobile Payments | | 4 | 0.931 | 0.770 |
| Continuance Use of Mobile Payments | | 4 | 0.921 | 0.745 |

<Table 6> Correlation between Constructs

| Construct | TPH | FC1 | FC2 | FC3 | PU | PE | MPH | SA | CU | Age | Gender | Frequency | Spending | History |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TPH | 0.950 | | | | | | | | | | | | | |
| FC1 | -0.135 | 0.940 | | | | | | | | | | | | |
| FC2 | -0.312 | 0.548 | 0.925 | | | | | | | | | | | |
| FC3 | -0.056 | 0.356 | 0.487 | 0.887 | | | | | | | | | | |
| PU | -0.286 | 0.095 | 0.365 | 0.145 | 0.930 | | | | | | | | | |
| PE | -0.236 | 0.121 | 0.320 | -0.005 | 0.736 | 0.958 | | | | | | | | |
| MPH | -0.396 | 0.146 | 0.411 | 0.077 | 0.682 | 0.636 | 0.946 | | | | | | | |
| SA | -0.215 | 0.171 | 0.304 | 0.098 | 0.627 | 0.583 | 0.570 | 0.937 | | | | | | |
| CU | -0.302 | 0.311 | 0.537 | 0.250 | 0.322 | 0.246 | 0.554 | 0.275 | 0.929 | | | | | |
| Age | 0.118 | -0.025 | -0.027 | 0.019 | -0.170 | -0.075 | -0.133 | -0.055 | -0.197 | 1 | | | | |
| Gender | 0.006 | 0.005 | 0.102 | 0.035 | 0.057 | 0.021 | -0.054 | -0.014 | -0.063 | -0.105 | 1 | | | |
| Frequency | -0.410 | 0.094 | 0.341 | 0.022 | 0.429 | 0.397 | 0.585 | 0.336 | 0.611 | -0.131 | -0.051 | 1 | | |
| Spending | -0.062 | 0.065 | 0.131 | 0.019 | 0.082 | 0.123 | 0.177 | 0.028 | 0.267 | -0.103 | -0.010 | 0.263 | 1 | |
| History | 0.098 | -0.106 | -0.064 | -0.209 | -0.023 | 0.080 | -0.020 | 0.019 | 0.024 | 0.215 | -0.134 | 0.076 | -0.050 | 1 |

Notes: The shaded numbers in the diagonal row are the square roots of the AVEs.
TPH = Traditional Payment Habit; FC = Facilitating Conditions; PU = Perceived Usefulness; PE = Perceived Enjoyment; MPH = Mobile Payment Habit; SA = Satisfaction; CU = Continuance Use; SE = Self-efficacy

Larcker, 1981). <Table 6> shows all the squared roots of the AVEs are greater than the levels of correlations involving the constructs. The factor loadings are also heavily loaded on its own construct than other constructs <Table 7>. This shows a good discriminate validity of the current measures.
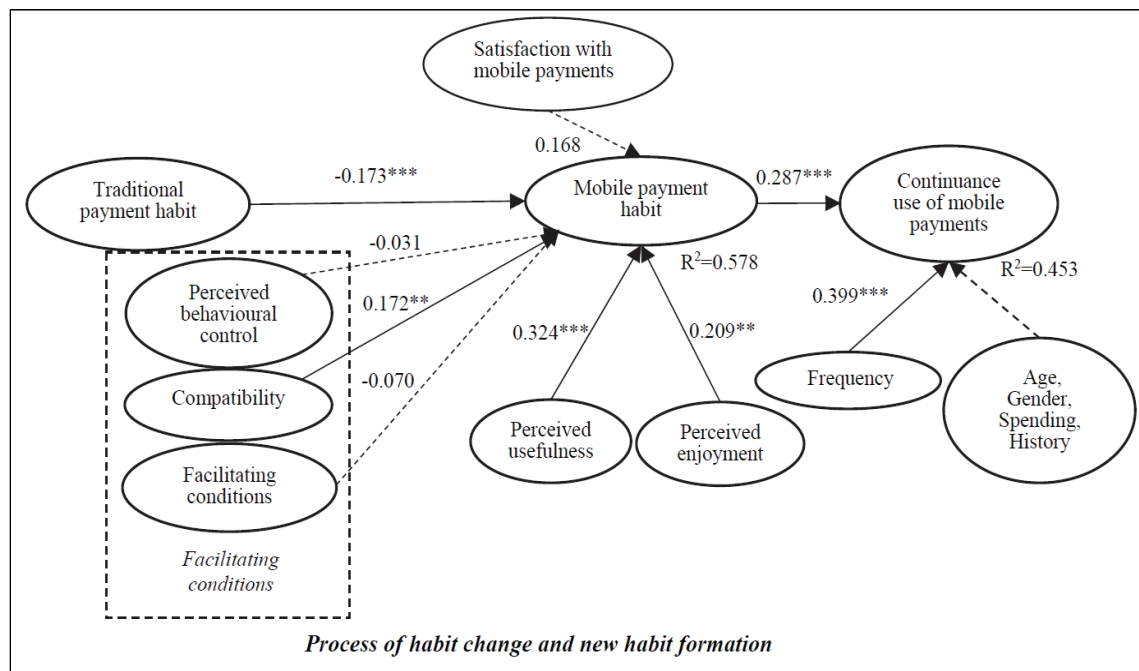
## 5.2. Structural Model

Upon confirmation of the measurement model, the structural model was tested by Bootstrapping approach of SmartPLS. The SmartPLS data analysis results were shown in <Figure 2> and <Table 8>.

<Table 7> Results of Confirmatory Factor Analysis

| Factor Loadings | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Construct | Items | TPH | FC1 | FC2 | FC3 | PU | PE | MPH | SA | CU |
| TPH | TPH_1 | **0.889** | -0.058 | -0.248 | -0.001 | -0.248 | -0.195 | -0.330 | -0.172 | -0.276 |
| | TPH _2 | **0.877** | -0.042 | -0.212 | 0.013 | -0.218 | -0.164 | -0.327 | -0.110 | -0.221 |
| | TPH _3 | **0.863** | 0.796 | -0.246 | -0.052 | -0.239 | -0.186 | -0.335 | -0.179 | -0.284 |
| | TPH _4 | **0.924** | -0.144 | -0.297 | -0.102 | -0.287 | -0.246 | -0.390 | -0.231 | -0.256 |
| | TPH _5 | **0.923** | -0.215 | -0.359 | -0.095 | -0.310 | -0.275 | -0.410 | -0.256 | -0.298 |
| | TPH _6 | **0.934** | -0.153 | -0.305 | -0.044 | -0.228 | -0.190 | -0.336 | -0.194 | -0.299 |
| FC1 | FC1_1 | -0.080 | **0.943** | 0.507 | 0.294 | 0.115 | 0.106 | 0.155 | 0.204 | 0.314 |
| | FC1_2 | -0.192 | **0.822** | 0.468 | 0.362 | 0.036 | 0.113 | 0.091 | 0.068 | 0.220 |
| FC2 | FC2_1 | -0.221 | 0.567 | **0.729** | 0.466 | 0.197 | 0.192 | 0.170 | 0.192 | 0.321 |
| | FC2_2 | -0.303 | 0.465 | **0.965** | 0.428 | 0.379 | 0.324 | 0.446 | 0.305 | 0.545 |
| FC3 | FC3_1 | -0.156 | 0.313 | 0.395 | **0.768** | 0.094 | -0.012 | 0.036 | 0.090 | 0.204 |
| | FC3_2 | -0.005 | 0.325 | 0.460 | **0.961** | 0.147 | 0.012 | 0.084 | 0.088 | 0.235 |
| | FC3_3 | 0.043 | 0.168 | 0.302 | **0.586** | 0.017 | -0.017 | 0.000 | -0.087 | 0.222 |
| PU | PU_1 | -0.272 | 0.117 | 0.362 | 0.237 | **0.859** | 0.635 | 0.572 | 0.595 | 0.254 |
| | PU_2 | -0.203 | -0.003 | 0.191 | 0.061 | **0.801** | 0.485 | 0.509 | 0.422 | 0.250 |
| | PU_3 | -0.256 | 0.047 | 0.344 | 0.117 | **0.902** | 0.695 | 0.637 | 0.565 | 0.286 |
| | PU_4 | -0.253 | 0.158 | 0.350 | 0.084 | **0.890** | 0.706 | 0.628 | 0.573 | 0.319 |
| PE | PE_1 | -0.216 | 0.124 | 0.304 | 0.038 | 0.689 | **0.915** | 0.601 | 0.601 | 0.245 |
| | PE_2 | -0.265 | 0.107 | 0.300 | -0.032 | 0.684 | **0.900** | 0.605 | 0.552 | 0.238 |
| | PE_3 | -0.189 | 0.097 | 0.257 | -0.010 | 0.627 | **0.912** | 0.546 | 0.453 | 0.171 |
| | PE_4 | -0.189 | 0.112 | 0.308 | 0.024 | 0.694 | **0.939** | 0.577 | 0.522 | 0.244 |
| MPH | MPH_1 | -0.242 | 0.073 | 0.300 | 0.005 | 0.579 | 0.585 | **0.819** | 0.490 | 0.429 |
| | MPH _2 | -0.256 | 0.131 | 0.361 | 0.104 | 0.564 | 0.592 | **0.850** | 0.556 | 0.407 |
| | MPH _3 | -0.339 | 0.054 | 0.306 | 0.026 | 0.631 | 0.536 | **0.872** | 0.523 | 0.443 |
| | MPH _4 | -0.424 | 0.170 | 0.389 | 0.094 | 0.631 | 0.569 | **0.942** | 0.507 | 0.547 |
| | MPH _5 | -0.391 | 0.162 | 0.418 | 0.078 | 0.664 | 0.594 | **0.941** | 0.512 | 0.544 |
| | MPH _6 | -0.447 | 0.181 | 0.421 | 0.099 | 0.592 | 0.552 | **0.940** | 0.484 | 0.583 |
| SA | SA_1 | -0.218 | 0.116 | 0.240 | 0.073 | 0.522 | 0.526 | 0.487 | **0.886** | 0.212 |
| | SA_2 | -0.168 | 0.216 | 0.288 | 0.164 | 0.577 | 0.560 | 0.517 | **0.899** | 0.246 |
| | SA_3 | -0.220 | 0.083 | 0.256 | 0.013 | 0.523 | 0.444 | 0.465 | **0.856** | 0.230 |
| | SA_4 | -0.154 | 0.176 | 0.281 | 0.086 | 0.575 | 0.510 | 0.527 | **0.868** | 0.273 |
| CU | CU_1 | -0.229 | 0.332 | 0.480 | 0.216 | 0.291 | 0.232 | 0.487 | 0.215 | **0.869** |
| | CU_2 | -0.281 | 0.243 | 0.439 | 0.240 | 0.308 | 0.256 | 0.521 | 0.300 | **0.873** |
| | CU_3 | -0.210 | 0.194 | 0.423 | 0.203 | 0.262 | 0.175 | 0.432 | 0.238 | **0.862** |
| | CU_4 | -0.323 | 0.306 | 0.515 | 0.202 | 0.248 | 0.182 | 0.469 | 0.188 | **0.849** |

*Notes: TPH = Traditional Payment Habit; FC = Facilitating Conditions; PU = Perceived Usefulness; PE = Perceived Enjoyment; MPH = Mobile Payment Habit; SA = Satisfaction; CU = Continuance Use*

Notes: ** p < 0.05; ***p < 0.01; the solid lines were supported, while the dotted lines were not supported.

<Figure 2> Structural Model Data Analysis Results

<Table 8> Summary of Path Coefficient Results

| Main Hypotheses | Path Coefficient | T-statistics | S/NS |
|---|---|---|---|
| H1: TPH → MPH | -0.173 | 2.781 | S |
| H2a: FC1 → MPH | -0.031 | 0.492 | NS |
| H2b: FC2 → MPH | 0.172 | 2.314 | S |
| H2c: FC3 → MPH | -0.070 | 0.969 | NS |
| H3: PU → MPH | 0.324 | 3.261 | S |
| H4: PE → MPH | 0.209 | 2.004 | S |
| H5: SA → MPH | 0.168 | 1.635 | NS |
| H6: MPH → CU | 0.287 | 3.600 | S |
| Control Variables | | | |
| Age | -0.104 | 1.518 | NS |
| Gender | -0.034 | 0.538 | NS |
| Frequency | 0.399 | 4.590 | S |
| Spending | 0.102 | 1.363 | NS |
| History | 0.022 | 0.329 | NS |

Notes: TPH = Traditional Payment Habit; FC = Facilitating Conditions; PU = Perceived Usefulness; PE = Perceived Enjoyment; MPH = Mobile Payment Habit; SA = Satisfaction; CU = Continuance Use; S = Significant; NS = Not Significant

As shown in <Figure 2> and <Table 8>, the path coefficient between traditional payment habit and mobile payment habit was negatively significant (-0.173) at 0.01 level, therefore H1 is supported. The path coefficients between perceived behavioral control and facilitating condition dimensions of facilitating conditions and mobile payment habit were insignificant. The path coefficient between compatibility dimension of facilitating conditions and mobile payments was significant at 0.05 level. These mean H2a and H2c were not supported, however, H2b was supported. Perceived usefulness and enjoyment were found positively influence mobile payment habit, the path coefficients were 0.324 and 0.209 respectively (H3 and H4 supported). With a T-statistic 1.635, satisfaction was not found to influence mobile payment habit significantly, therefore, H5 was not supported. In addition, mobile payment habit was tested to significantly influence continuous use of mobile payment (0.287), therefore, H6 is supported. Finally, except mobile payment frequency (0.399), all other control variables were not found to significantly influence continuous mobile payment use. The R square values of the two dependent variables (mobile payment habit and continuous use) are 0.578 and 0.453 respectively. This means the five independent variables explained 57.8% of the variance in mobile payment habit, and all the independent variables, mediator and control variables accounted for 45.3% of the variance in continuous use. These results demonstrated a good explanatory power of the current research model.

## Ⅵ. Discussions

This study investigates the way consumers develop their new mobile payment habit while the traditional payment habit is still entrenched. Based on psychology theory of habit, a theoretical model on habit formation and change, and habit's influence on continuance use was developed. It was then empirically tested by two rounds of the cross-sectional surveys. Most of the hypotheses in the research model were well supported.

First, the data analysis results verified the co-existence of traditional payment habit and mobile payment habit, it further proved a negative relationship between these two constructs. This result is consistent with Wood and Rünger (2016)'s psychology theory of habit: the long-term strong memory representation of using traditional payment habit does not go away easily; given the limited information processing capacity, individual consumer is less likely to form a new mobile payment habit when the traditional habit is present. This result is also consistent with Polites and Karahanna (2012) that the incumbent system habit inhibits the new system acceptance.

Second, among the three facilitating conditions constructs, only compatibility (FC2) was found to be significant in influencing mobile payment habit. Perceived behavioral control such as resources and knowledge about mobile payments and the existence of necessary facilities, such as right technology infrastructure, vender offered payment platform and on spot help or notice from the shop cannot help to form mobile payment habit. This means mobile payment's consistency with one's existing values, needs, and experiences is more important than perceived behavioural control and objective facilitating factors in habit change and new habit formation. It somehow implies a strong impact of the entrenched payment methods in market- the long-term strong memory representation of using traditional payment habit does not go away easily. If the mobile payment method is consistent with the past payment methods (the

traditional payment habit) for in-store transaction, it will then facilitate the change from the old habit to the new payment habit. This result is consistent with prior research on mobile payment habit. For instance, Lin et al. (2018) claimed that if the payment platform provides a perceived coherent, compatibility, familiarity, and harmony to customer need, there is a possibility of using mobile payments again. Handarkho et al. (2021) also proved that perceived compatibility is a trigger to provide a stable environment to encourage the development of the habit to use mobile payments in a physical store. In terms of perceived behavioral control, our research result is different from past work (e.g., Kaushal et al., 2020) that believe perceived behavioral control is an important factor to ease when carrying out a particular behavior. It means prior knowledge and resources at hands are not necessities to trigger mobile payment formation. Similarly, objective factors such as guidance, instructions, and people as facilitating conditions are also not significant in influencing habit change and formation. This result is contradictory with habit learning mechanism in psychology theory of habit. In sum the results of H2a, H2b and H2c open up an interesting discussion on different dimensions of facilitating conditions, and the exact function of facilitating conditions in mobile payment habit formation.

Third, in line with the literature, perceived usefulness and enjoyment were found significantly influence mobile payment habit. Psychology theory of habit deemed perceived usefulness and enjoyment as rewarding mechanisms in habit formation (Wood and Neal, 2009) and rewarding cues in habit change (Anderson and Wood, 2020). If an individual believes that a particular information technology provides benefits, he or she will accept the technology and increase the frequency of using it. Mobile payments can not only provide convenient functions, but also hedonic benefits. Our research findings are congruent with prior research on IS adoption in general (e.g., Venkatesh et al., 2012) and mobile applications adoptions in particular, (e.g., Chen et al., 2020).

Fourth, satisfaction as a self-monitoring mechanism, feedback, affect and intrinsic reward was not found to significantly influence mobile payment habit formation and change. This is somehow inconsistent with the habit literature on affect and feedback (Hermsen et al., 2016; Weyland et al., 2020), and IS literature on habit (Limayem et al., 2007 and Lankton et al., 2010). One possible explanation could be data on satisfaction in this study was collected in the first round of the survey. The affective judgements refer more to the beliefs or expectations about affect and are therefore not affective response (Ekkekakis et al., 2018), and long-term study should be more appropriate to examine affective determinants of habit formation. Ideally, satisfaction as a feedback and affective response should be collected in the second round or time two of the survey study. Though satisfaction was not tested to be influential in the present study, its theoretical value and contribution should not be ignored in IS habit research, and mobile payment habit research in particular. We will further address it in the limitation session.

Fifth, consistent with the majority of the literature on IS habit, mobile payment habit was found to significantly influence continuous use. Habit is the driver of continuous use in Venkatesh et al. (2012) and Lankton et al. (2010). Together with most of the post IS adoption research, this study suggested that the stronger an individual's tendency to use mobile payments automatically from learned responses, the more willingly he or she would continue using it in the later stage.

Last, the control variable - frequency of using mo-

bile payments - presented a significant relationship with continuous use. This result is consistent with prior research that frequency (Limayem et al., 2007) and prior IT use (Lankton et al., 2010) predict its continued use.

# Ⅶ. Implications

## 7.1. Theoretical Implications

There are three folds of theoretical contributions of this study. The most important theoretical contribution is to use psychology theory of habit in explaining the substitution process of payment habit. In the substitution process, facilitating conditions were defined as associative mechanism which enable contextual cues; perceived usefulness and enjoyment were treated as utilitarian and hedonic benefits and rewarding mechanisms in habit formation; satisfaction was theorized as a feedback, affect and intrinsic reward to disrupt the old habit and form new habit. The results of our study confirmed the explanatory power of associative mechanism and rewarding mechanism in habit change and formation. Secondly, we believe habit formation and habit change may happen at the same time: new habit formation is a slow process, if there is no existing habit, then it is a "0" to "1" process; however, if an old habit is still entrenched, then, it would be a substitution process: new habit will gradually substitute old habit (Adriaanse et al., 2010). Therefore, new mobile payment formation and habit change happen at the same time in the present study. Thirdly, prior research on the formation of new payment habit has largely overlooked the traditional payment habit, which existed before mobile payment habit and acted as a salient alternative payment method

(Cheung and Limayem, 2005). In this research, we witnessed the co-existence of traditional payment habit and mobile payment habit and validated the significant influence of traditional payment habit on mobile payment habit.

Secondly, with a focus of habit, this study re-confirmed the traditional IS habit theory in explaining continuous IS use (e.g., Lankton et al., 2010). By doing this, the present study successfully expands the application of IS continuous model to the area of mobile payment research. In addition, it also extends the traditional IS adoption models by investigating specifically the changing and formation mechanisms of new habit in the context of mobile payments.

Thirdly, our study confirmed that one dimension of facilitating conditions is significant in influencing mobile payment habit formation. Compared with many other typical IS studies (Venkatesh et al., 2012) that investigated three dimensions at the same time, our study is one of the pioneer studies to emphasize the important role of compatibility in mobile payment habit formation. Perceived behavioral control and facilitating conditions did not demonstrate similar significant impact on mobile payment habit. This result is somehow inconsistent with the literature, yet opening up an interesting discussion on the use of the right contextual cues to facilitate habit transition.

Last, opposite to the majority of IS habit research, satisfaction was not verified to have a significant impact on mobile payment habit formation. By theory, satisfactory experiences with a behavior are a key condition for habit development as they increase one's tendency to repeat the same action (Aarts et al., 1997); satisfaction is also a significant feedback, affect and intrinsic reward to trigger habit. Though it was not found to be influential in the present study, it carries a considerable amount of weight

in understanding habit formation and habit change and deserves a careful consideration in future research.

## 7.2. Practical Implications

As to practical implications, first, the findings of this study suggest that companies should be aware of challenges induced by the prior existing habit when introducing a new payment method to consumers. Even when the mobile payment habit has been formed, consumers may still carry the traditional payment habit, which pre-exists and/or co-exists with the mobile payment habit. In view of this, companies should be ready to develop long-term plan for the introduction of new mobile payments.

Second, facilitating conditions, especially compatibility with the existing payment methods, are important in forming the new mobile payment habit. Retail companies collaborating with platform developers should make sure the way of using new mobile payment method is consistent with that of the existing octopus card or credit card payment methods to remove physical or psychological barriers when finishing transactions in store.

Third, for the developer or designer of mobile payment applications, more useful and hedonic information and functions should be provided to trigger the mobile payment habit. Fintech innovators like Alipay HK should design user interfaces in a user-friendly way to enhance the effectiveness of mobile payments; they should also consider offering not only monetary rewards (e.g., red pockets) but also hedonic experiences (e.g., gamification elements) via mobile payment applications to consumers. All these endeavors will eventually stimulate continuous use of mobile payments in the long run.

Last, compared with most traditional post IS adop-tion research, this study emphasizes the role of mobile payment habit in forming continuous use behavior. This result calls for attention from the practitioners to think more about how to help consumers develop new mobile payment habit.

## 7.3. Limitations and Future Research

The findings should be considered in light of the limitations of the study.

First, we collected data from student samples. Thus, it is possible that the results will not apply well to other subjects or populations that differ in age, experience, or context. However, students constituted a natural population of mobile payment users as youngsters are usually pioneers and frequent users of mobile technologies (Erickson, 2012).

Second, though data of the dependent variable was collected at a different time, the majority of measurements in our research are self-reported and collected from single source and at one time. Future research may adopt longitudinal designs and gather samples from multiple sources as much as possible to improve the reliability of conclusions.

Third, the study was conducted in Hong Kong, a place that is in the early stage of mobile payments adoption, and at the same time, has well-entrenched traditional payment habits. Cautions need to be paid when generalizing the results to other countries with different adoption stages and payment habits.

Fourth, as mentioned earlier, data on satisfaction was collected in the first round of survey, this somehow lessens the explanation power of satisfaction as a feedback mechanism in habit formation. Further studies should reinvestigate and reconfirm the theoretical significance of satisfaction in habit research.

Last, though our study results demonstrated a very good explanatory power, we still call for research

to further explore psychological theories of habit and investigate more possible perspectives. For instance, antecedents and consequences of habit, and how habit is formed and transferred overtime. Regarding to mobile payment habit alone, data privacy and security via mobile devices is one potential dimension for further consideration. Longitudinal and case studies might also provide more insights in the above-mentioned areas.

## Ⅷ. Conclusion

Mobile payments started gaining in popularity in recent years. In some countries or areas, after an initial try, most of the local citizens are still hesitating to widely adopt mobile payments in their everyday lives. This study investigated the reasons and hindrances of mobile payment habit formation and the transition from traditional payment habit to mobile payment habit. It also examined the influence of mobile payment habit on continuous use. Our study contributed to the literature of post IS adoption by incorporating psychology theory of habit and discussed the mechanism of which traditional payment habit would affect mobile payment habit. The results found compatibility dimension of facilitating conditions, perceived usefulness and enjoyment are significant predictors of mobile payment habit. It also emphasized the important role of mobile payment habit in influencing actual behavior. Our contextual specific study provides practitioners with new insights on how to successfully introduce mobile payments to an emerging market, e.g., how to design the mobile payment applications to make them more useful, enjoyable, and compatible with the existing payment habit. Overall, this is an interesting and innovative study applying psychology theory of habit in explaining mobile payment habit formation and habit change. The research findings are believed to be helpful in directing future post IS adoption/IS habit research and practice.

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