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Factors Influencing Behavioural Intention to Adopt the QR-Code Payment:
Extending UTAUT2 Model

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ABSTRACT

This study aims to identify the factors that affect the consumers' behavioural intention to adopt the quick response code (QR-code) mobile payment. This study extends the unified theory of acceptance and use of technology 2 (UTAUT2) with the personal innovativeness construct. This study reveals that performance expectancy, social influence, habit, price value, and personal innovativeness in information technology are significantly related to behavioural intention to adopt QR-code mobile payment. However, effort expectancy, facilitating conditions, and hedonic motivation are found to be statistically insignificant. This study presents one of the few empirical works investigating the role of consumer innovativeness and thus validates the inclusion of personal innovativeness as constructed in mobile payment adoption research. Findings from this study provide valuable insights for mobile payment application developers and mobile payment marketing teams.

KEYWORDS

Behavioural Intention, Malaysia, Mobile Payment, QR-Code, UTAUT2

1. INTRODUCTION

Quick response code (QR-code) starts as a barcode with a special purpose, which is for use in supermarkets. In the 1960s, Japan experienced a wave of rapid economic growth. Supermarkets also experience this wave in Japan. So they realised that they needed a way to keep track of everything. QR-code was first created by Hara Masahiro, an engineer for Denso Wave, a Toyota subsidiary, to help in the manufacturing process. QR-code first used in Japan's Kanban, a type of electronic communication tool used in the automotive industry (Stein, 2020). QR-code was used in manufacturing and expanded to the logistics and retailing industry. The use of QR-code grows rapidly in various industries because of its advantages. In the marketing field, QR-code had been used widely to understand consumer behaviour (Trivedi et al., 2019), market research (Tolliver-Walker, 2011), retailing, and marketing communication (Watson et al., 2013).

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In January 2015, the Malaysian government introduced the E-Tunai Rakyat initiative to develop the trend of using mobile payment (The Sun Daily, 2020). The trend of mobile payment has encouraged many industries to adopt a Quick response code (QR-code) payment system to establish effective operating business ways. At the beginning of its use in Malaysia, the banking and retail industry has begun the first step by providing mobile scanning services to provide fast and comfortable services to customers in making payments. Although cash payments still play an essential role in the country, accounting for more than 80% of transactions (Amarthalingan, 2017), but with the increasing use and mobile subscriptions, as well as the growing penetration of the internet, the use of E-wallets in Malaysia continues to increase. In March and April 2020, E-wallet usage has reached 40% (Azahar, 2020). Compared to other mobile payment methods, QR-code is seen as the most promising technology in remote payments, gaining higher popularity among consumers and merchants (Chua, 2017). Due to lower infrastructure costs and a high penetration rate of mobile phones in Malaysia, it is predicted that QR-code has the potential to become a cost-effective alternative to cash in the near future (Amarthalingam, 2017).

Even though the number of QR-code mobile payment platforms is slowly increasing, little is known about the service's adoption. Most of the research contributes to the more in-depth analysis of security, privacy, fraud, and risk of a QR-code mobile payment system (e.g. Zhuang et al., 2017). A handful of researchers have examined a single aspect of consumers' attitudes toward using and accepting QR-code (Trivedi et al., 2019). However, only a few empirical studies have been conducted to understand consumer's adoption intention towards mobile payment in an emerging market (Patil et al., 2020). Therefore, it remains a research gap in Malaysia as studying a particular mobile payment system is insufficient to establish a generalisation of consumers' behaviour towards the acceptance of mobile payment.

2. LITERATURE REVIEW

2.1. Mobile Payment

Mobile devices have key features in distinguishing between mobile payments from other forms of payment (Phonthanukitithaworn et al., 2016). The differences can be found during the payment process that generates different outcomes (Liébana-Cabanillas et al., 2014). Dahlberg et al. (2015) classify mobile payment systems into two categories: remote and proximity. A remote payment system enables consumers to pay for online purchases through short message services or remote payment servers, such as mobile banking and mobile shopping. Proximity payment system represents a payment mode for purchasing ticketing, dining, or point-of-sale items, such as QR-code payment (Zhou, 2013).

By using QR-code payment, consumers have the benefits of avoiding crowds, queuing, and saving travel costs and time (Business Standard, 2016). The payment method increases the efficiency and customers' satisfaction by allowing speedy completion of transactions (Lou et al., 2017). QR-code mobile payments are less superior in terms of security and performance compared with NFC mobile payments. However, QR-code mobile payment can significantly reduce initiatives' dependencies on other stakeholders, and the adoption cost for consumers and merchants. Furthermore, it ensures good interoperability among mobile network operators, mobile device providers, and banks (de Reuver & Ondrus, 2017).

2.2. Theory

Several technology acceptance models or theories have been extended in the context of mobile payment, such as Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Diffusion of Innovation Theory (DOI), Unified Theory of Acceptance and Use of Technology (UTAUT), and Unified Theory of Acceptance and Use of Technology 2 (UTAUT2).

Among these models or theories, TAM has been widely used and underpinned in mobile payment acceptance research (Khalilzadeh et al., 2017; Dahlberg et al., 2015; Ramos de Luna et al., 2019).

UTAUT2 is used in this research. UTAUT2 is considered as a comprehensive model as it integrates the constructs of previous technology adoption theories (Baptista & Oliveira, 2015) and provides a clear relationship between the essential customer-oriented concepts and measures of behavioural intentions (Morosan & DeFranco, 2016). The selection of UTAUT2 as the basic theory in this study is the result of several evaluations. Tamilmani et al. (2021) evaluate that UTAUT2 overall focus theory includes importance, novelty, parsimony, level and Falsifiability dimensions.

- Importance: In less than ten years, UTAUT2 has collected more than 6000 citations with extensive of usage. UTAUT2 focal phenomenon "consumer" user class is of greater importance to practice with the burgeoning consumer technology industry.
- Novelty: The novelty of UTAUT2 lies conceiving the existing focal phenomenon of individual technology acceptance in new context i.e. consumers.
- Parsimony: UTAUT2 has achieved higher exploratory power for both behavioural intention (56 percent to 74 percent) and technology use (40 percent and 52 percent) in comparison to UTAUT.
- Level: UTAUT2 is formulated as a micro level theory with consumers as a focal phenomenon.
- Falsifiability: UTAUT2 is a testimony of its well-articulated focal phenomenon and parts of the theory.

In recent years, most of the Malaysian studies validate the UTAUT2 in a web-based technology context; however, fewer studies have been done in the mobile technology context. For instance, researchers investigate the influence of UTAUT2 constructs on e-learning system (UI-Ain et al., 2016), mobile learning (Yang, 2013), lecture capture system (Nair et al., 2015), and social networking sites (Fard et al., 2016). Only a few researchers include UTAUT2 constructs in attempts to predict mobile payment use.

3. HYPOTHESES DEVELOPMENT

3.1. Performance Expectancy (PE)

Performance Expectancy (PE) is the degree to which using a particular technology will provide benefits and enhances to consumers in performing specific tasks (Al-Saedi et al., 2020). Performance Expectancy variable represents perceived usefulness (Davis, 1989), extrinsic motivation (Davis et al., 1992), job-fit (Thompson et al., 1991), relative advantage (Moore & Benbasat, 1991) and outcome expectations (Compeau & Higgins, 1995). It is a recognised antecedent of behavioural intention to technology adoption (Venkatesh et al., 2012). In the technology adoption context, performance expectancy represents such features as efficiency, effectiveness, time and money-saving, benefit seeking and others that are known to attract users to mobile application (Hew et al., 2015). Kim et al. (2015) also mention convenience among the features that may draw consumers to mobile applications and differentiate mobile applications from other competing technologies.

Various empirical researchers have delivered support for the belief that performance expectancy is a key forecaster of mobile payment adoption, capturing the considered advantages linked with mobile payment adoption (Slade et al., 2015; Baptista & Oliveira, 2015; Oliveira et al., 2016; Wu and Lee 2017). Researchers believe that mobile payment services could improve payment efficiency, such as eliminating the need to carry cash, shortening payment time, and improving payment convenience by paying anytime and anywhere (Morosan & DeFranco, 2016). Besides, the simplified payment process has greatly increased peoples' intention of mobile payment services (Shin, 2010). Thus,

H_1: Performance Expectancy has a positive effect on behavioural intention to adopt QR-code payment.

3.2. Effort expectancy (EE)

Effort expectancy (EE) is defined as an individual's evaluation of the effort necessary to complete a task using a given technology (Venkatesh et al., 2012). When consumers perceive higher effort in using innovative technology, their tendency to utilising the technology will decrease (Zhou, 2011). Effort expectancy is interchanged with perceived ease of use and complexity (Venkatesh et al., 2003). Because services on mobile devices may be viewed as complicated and tedious due to the various physical constraints associated with mobile payment (such as difficulties inputting information or unclear navigations), mobile payment must comprise ease of learning. Taylor and Levin (2014) report that mobile application users are interested in the simplicity of transaction and prefer mobile applications with less distracting and irrelevant features. Moreover, Cugola et al. (2014) mention that customers prefer adaptive and functional applications on various devices.

Effort expectancy has been validated as a significant antecedent of intentions to use new technology (Venkatesh et al., 2012). Yet, Morosan and DeFranco (2016), and Oliveira et al. (2016) found that mobile phones; ubiquity makes Effort expectancy for mobile-based technology less important. Supports for the role of effort expectancy in the behavioural intention are provided by previous studies (e.g. Wong et al., 2015; Tan & Lau, 2016; Ahmed & Phin, 2016). Effort expectancy has also been shown to positively influence behavioural intention in the context of mobile payment in Malaysia (Teo et al., 2015; Ramayah et al., 2017). Also, Chong (2013) found that effort expectancy does not affect behaviour intention to use familiar technology. The findings explain that effort expectancy might be more significant for non-users who are unfamiliar with mobile payment (Slade et al., 2015). Thus,

H_2. Effort Expectancy has a positive effect on behavioural intention to adopt QR-code payment.

3.3. Social Influence (SI)

Social influence is found to affect the user's adoption and recommendation to m-wallet services (Singh et al., 2020). During the early stages of technology implementation, most of the potential users experience a lack of reliable information on them (de Kerviler et al., 2016). As such, social context plays a large role in influencing the attitude towards the new system (Oliveira et al., 2016). Social influence is equivalent to the subjective norm in the Theory of Reason Action (Taylor & Todd, 1995), where Venkatesh et al. (2012) define this construct as the degree to which an individual perceives the approval of certain behaviours by other people's opinions, superior influences, and peer influences in their studies. Social influence has been considered as a critical component in the decision- making process for people in behavioural science (Lu et al., 2017). From a consumer power perspective, Wei et al. (2009), and Lu (2014) claim that social influences can be reflected in the current high interconnection between individuals stemming from the rapid development of social media. Thus, mass media becomes a source of social influence. On the other hand, payments are generally made in a public or social environment where individuals can observe other behaviour and thus possibly to be influenced by the people who are important to them (Koenig-Lewis et al., 2015). It is then believed that the adoption of mobile payment will be easy when it is supported and approved by family members, friends, colleagues, and so forth (Wei et al., 2009; Dinh et al., 2018).

Several mobile technology studies in developing countries incorporate social influence into their operational models (Wei et al., 2009; Chong 2013; Chan & Chong, 2013). Patil et al. (2020) support the positive relationship between social influence and behavioural intention to adopt mobile payment. Drawing the above literature review, the adoption of mobile payment can be determined by social influence. Thus,

H_3: Social Influence has a positive effect on behavioural intention to adopt QR-code payment.

3.4. Facilitating Conditions (FC)

Facilitating conditions refer to the user perceptions of the availability of the resources and support to utilise a given technology (Venkatesh et al., 2012). Facilitating conditions make the use of technology easier and influence the adoption of mobile technology (Nisha et al., 2019). Venkatesh et al. (2003) formulate facilitating conditions construct from the model of PC utilisation (Thompson et al., 1991), perceived behavioural control (Ajzen 1991; Taylor & Todd, 1995) and compatibility (Moore & Benbasat, 1991).

Kim et al. (2015) describe that customisation among the features could increase the user willingness to interact with the mobile application. Also, Morosan & DeFranco (2016) confirm the importance of service personalisation for mobile payment applications' adoption. Moreover, Cugola et al. (2014) describe that it is important for mobile applications to be adaptive and functional on various devices. Hence, user knowledge, experience, environments, and high compatibility levels could lead to a higher degree of innovation adoption. As mobile applications become more interactive, the ease with which the innovation fits into a consumer's current lifestyle or situation may also become a facilitating condition for the intention to adopt mobile applications (Legner et al., 2016).

Customers must have basic operational knowledge, skills, resources, and technical infrastructure to perform a task through innovation (Alalwan et al., 2017). Previous technology-adoption studies demonstrated positive effects of facilitating conditions on the use of new technologies as well (Alalwan et al., 2017; Morosan & DeFranco, 2016). A previous study states that infrastructure such as smartphones, 4G services, Internet access, and secured applications are possible factors that motivate mobile payments adoption (Teo et al., 2015). In replicating the UTAUT2, Hew et al. (2015) report that the high level of users' perception of facilitating conditions, such as online support, mobile devices, and an internet connection, influences the intention to adopt the mobile application. Patil et al. (2020) found that there is a positive impact of facilitating conditions toward the behavioural intention of mobile payment. Therefore:

H_4: Facilitating Conditions has a positive effect on behavioural intention in QR- code payment.

3.5. Habit (HT)

Habit is defined as the automatic performance of specific tasks or behaviours among consumers because of the satisfactory results obtained in a similar task environment (Venkatesh et al., 2012). Nowadays, mobile services have been well integrated into human lives (Hew et al., 2015). The usage behaviour makes users unconsciously reliant on mobile technology services as they are more likely to repeat behaviours that can be performed with less effort (Hsiao et al., 2016). Hence, it is believed that mobile phones' repetitive use for services will slowly evolve into a habit. The habit then fosters the user's intention to adopt a similar mobile technology without planning (Giovanis et al., 2012).

Psychology and behavioural sciences also suggest that users' habits are important factors of IT adoption (Limayem et al., 2007). Venkatesh et al. (2012) found that habit has a more significant effect on behaviour than any other UTAUT2 variables. Yet, habit development requires repetition or practice (Gardner et al., 2014). Therefore, the habit construct is excluded in few mobile payment research studies since habit is less applicable in a relatively new technology that has yet to gain widespread use among consumers to form a used habit (Oliveira et al., 2016; Koenig-Lewis et al., 2015; Slade et al., 2015). However, Jia et al. (2014) examine the effect of different technology usage habits and found that mobile service usage has a positive relationship with users' intention to use mobile payments. The result denotes that mobile payments and other mobile commerce apps are similar to some extent, as the app usually guides users through the paying process, which are comparable to mobile payments contexts. Accordingly, the habit may enable the transfer of actions from general to particular contexts (Morosan & DeFranco, 2016), allowing behaviours to manifest in the presence of QR-code payment.

Indeed, some studies find that when forming a habit of using mobile technology, consumers would increase their willingness to use similar mobile technology services (e.g. Hsiao et al., 2016; Baptista & Oliveira, 2015). For example, Yen & Wu (2016) demonstrate that customers are likely to use mobile financial services due to personal habit. A study conducted by Morosan & DeFranco (2016) also found that habit will influence the consumers' development of intentions to use Near Field Communication (NFC) mobile payment. Therefore, based on the findings above, this study posits the following hypotheses:

H_5. Habit has a positive effect on behavioural intention to adopt QR-code payment.

3.6. Hedonic Motivation (HM)

Hedonic motivation represents the "intrinsic motivations" within the consumers (Kim, 2016). HM is interchangeable with perceived enjoyment, where consumers adopt new technologies to enhance performance and as sources of enjoyment (Koenig-Lewis et al., 2015). Hedonic motivation plays a significant role in technology adoption, such as mobile banking (Alalwan et al., 2017), mapping apps, and mobile commerce (Verkijika, 2018). In the context of mobile payment, hedonic motivation involves a desire to experience instant gratification and emotionally satisfaction with an emerging system (Koenig-Lewis et al., 2015). Due to the fact that QR-code mobile payment is considered as a novel technology, the technology might stimulate feelings of joy and gratification in using it (Alalwan et al., 2016).

Apart from the novelty-seeking trait, de Kerviler et al. (2016) also identify that if consumers enjoy the interface design (e.g., detailed information, attractive digital receipt patterns and interactive designs), they find the emotional motivation to interact with the system (Simintiras et al., 2014). Besides that, the interactive features (e.g., gamification) of smartphone applications might bring meaningful enjoyment, which is expected to increase customers' intention to use them (Kim & Ahn, 2017). Hedonic motivation is a salient construct in the mobile payment adoption process among consumers (Morosan & DeFranco, 2016). It is found to positively influence new users' behavioural intention on proximity mobile payment (Wu & Lee 2017). Also, the perceived entertainment value has a significant effect on Malaysian consumers' acceptance of mobile applications (Goi & Ng, 2011). Thus:

H_6: Hedonic Motivation has a positive effect on behavioural intention to adopt QR- code payment.

3.7. Price Value (PV)

Price value is defined as consumers' cognitive trade-off between the applications' perceived benefits and the monetary cost for using them (Venkatesh et al., 2012). Price value is evaluated according to the values of service offered, compared with the consumer's monetary sacrifices to acquire and use a service (Venkatesh et al., 2012). According to Chong (2013), the monetary cost is measured by the cost paid for accessing mobile app, such as the mobile equipment (smartphone), network charges and mobile maintenance fee that can be weighed against the perceived benefits of mobile payment (e.g. Slade et al., 2015; Balachandran & Tan 2015; Alalwan et al., 2016; and Alalwan et al., 2017).

Consumers have to bear the monetary cost of using technology (Venkatesh et al., 2012). A study based on consumers' perspectives often omits the price value construct, by considering the fact that the mobile application provided is free of charge (e.g. Koenig-Lewis et al., 2015). However, price value has been studied (e.g. Wu and Lee 2017, and Alalwan et al., 2017) in various contexts such as mobile payment, mobile banking and mobile internet. Alalwan et al. (2017) indicate that customers' intentions are derived by the role of price value due to the lower costs of financial transactions applied by mobile banking. The significant influence of perceived price value over intention has also been proven by Deng et al. (2014) on the utility of a free mobile health app. Ooi & Tan (2016), and Tan

et al. (2014) have found that sunk cost is of no concern to consumers as they perceive the prices of devices and data plan as reasonable for the usage of NFC mobile (Teo et al., 2015). In light of the initial findings, this study proposes that the consumers will perceive that the benefit of using mobile payment is of greater value than monetary cost. Therefore, a further hypothesis is that:

H_7: Price Value has a positive effect on behavioural intention to adopt QR-code payment.

3.8. Personal Innovativeness in Information Technology (PIIT)

The QR-code payment method delivers an innovative and new way for some users to achieve greater payment efficiency, also toward the digital economy. Agarwal & Prasad (1998) developed personal innovativeness in information technology, which is defined as "the willingness of an individual to try out any new information technology". Personal innovativeness in information technology refers to the personal trait variable, symbolising the risk-taking propensity that exists in certain individuals. Consumers with personal innovativeness in information technology are recognised as capable of coping with large amounts of uncertainty, thus they tend to develop more favourable intentions towards using innovations or new technology (Lu et al., 2005).

Yang et al. (2012) found personal innovativeness in information technology plays a significant role in facilitating the initial adoption of mobile payment services. Similarly, Thakur and Srivastava (2014), and Patil et al. (2020) have confirmed that the adoption of mobile payment is determined by personal innovativeness in India. Tan et al. (2014) also conduct a study with respondents in Malaysia, and the findings verify that personal innovativeness in information technology has the strongest impact on the intention to adopt mobile payment. This study believes that personal innovativeness in information technology consumers is more likely to explore and adopt QR-code mobile payments. Therefore:

H_8: Personal innovativeness has a positive effect on behavioural intention to adopt QR-code payment.

3.9. Behavioural Intention (BI)

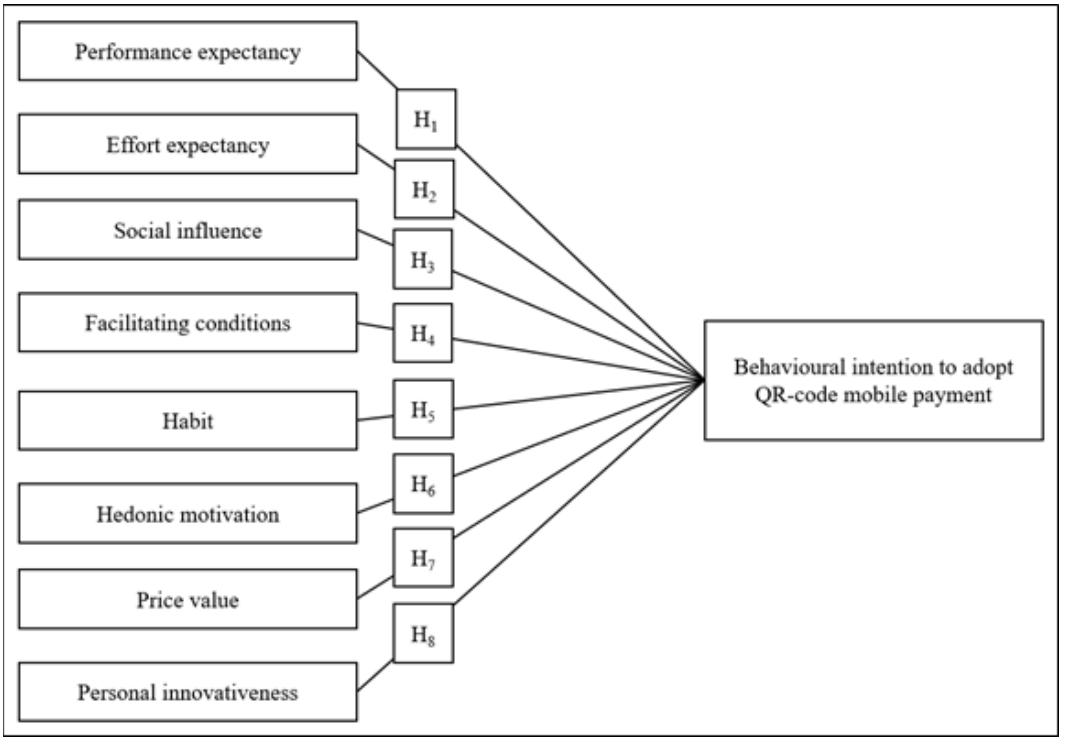
Behavioural intention is defined as a person's intention to perform various behaviours (Fishbein & Ajzen, 1975). The construct originally developed in Theory of Planned Behaviour and Theory of Reason Action, and is widely used in the following models related to technology acceptance (e.g. TAM (Davis, 1986), TAM2 (Venkatesh & Davis, 2000), TAM3 (Venkatesh & Bala, 2008), UTAUT (Venkatesh et al., 2003), and UTAUT2 (Venkatesh et al., 2012). Intentions to perform a behaviour result from conscious decision-making (Davis, 1989), and thus they represent probabilities of behavioural responses (Fishbein & Ajzen, 1975). Prior studies showed that behaviour intention is driven by an individual's attitude towards actual behaviour and social norms (Tan et al., 2014). Consumers with a higher intention to adopt new technology are more likely to become adopters (Leong et al., 2013) and to recommend the technology to others (Miltgen et al., 2013). Behaviour is suitable to use when the system is not uniformly deployed, and actual use of behaviour cannot be observed (Morosan & Defranco, 2016). Therefore, consumers' intentions to use the QR-code payment system is used in this study as an indicator of actual use behaviour.

4. METHODS

Figure 1 illustrates the research model that can be used to achieve the purpose of this study. The development of this model is based on discussions in the hypothesis development section.

The target population of this study is consumers who are involved in the payment process at regular intervals. There is a strict selection for consumers who are 18 years old and above as they are the eligible consumer group that can register to mobile payments application. For sample size,

Figure 1. Research model



we target at least 384 samples. In total, we managed to collect 453 samples (refer to Table 1). Hair (2003) states that a minimum sample size of 200 is required for Structural Equation Modeling (SEM). Comrey & Lee (1992) comment that the sample size of 300 is good. Apart from that, Krejcie & Morgan (1970) suggest a sample size of 384 as sufficient for a population size of more than 1 million. The sample for this study is selected using the mall-intercept convenience sampling technique. Paper-based questionnaires are distributed at the shopping malls of each selected areas, namely Kuching, Sibu, Miri and Bintulu. The four cities were chosen due to the population size, readiness to use digital payment, and the development strategy for the digital economy. The shopping mall is selected as payment transaction frequently happen due to the primary role as a centre of purchasing goods (Balachandran & Tan 2015).

Table 1. Demographic

Variables	Categories	Frequency	Percentage
Gender	Male	185	40.8
	Female	268	59.2
Age	18-24	166	36.6
	25-34	197	43.5
	35-44	66	14.6
	45-54	18	4
	55-64	6	1.3
Ethnicity	Malay	71	15.7
	Chinese	295	65.1
	Iban	47	10.4
	Others	40	8.8
Level of education	Secondary School	124	27.4
	Diploma	91	20.1
	Bachelor Degree	214	47.2
	Master Degree/ Professional Qualification/ PhD	24	5.3
Employment	Employee	247	54.5
	Self-Employed	68	15
	Student	110	24.3
	Homemaker	10	2.2
	Retired	2	0.4
	Unemployed	16	3.5

Fifty-two items (refer to Table 2) were used to measure the nine variables in the research framework. The performance expectancy was measured with 5 items based on the study of Venkatesh et al. (2012), and Davis (1989). The 6 items of effort expectancy in this study are measured based on the item advanced by Venkatesh & Bala (2008), and Venkatesh et al. (2012). Eight items of social influence in this study are adapted from Wei et al. (2009), and Venkatesh et al. (2012). The measurement of 6 items from Moore & Benbasat (1991), and Venkatesh et al. (2012) are adapted to measure facilitating conditions. Five items of the habit questionnaire are adapted from Venkatesh et al. (2012), and Limayem et al. (2007). For hedonic motivation, six items are adapted from Van der Heijden (2004), and Venkatesh et al. (2012) in this study. The five measurement items for price value are adapted from Kim et al. (2007). Personal innovativeness in information technology is measured by adapting six items by Goldsmith & Hofacker (1991), and Agarwal & Prasad (1998). The final scale measures behavioural intention is measured with a five-item scale adapted from the work of Venkatesh & Davis (2003), Venkatesh et al. (2012), and Zarmpou et al. (2012). The scale used in questionnaires is based in 5 Likert scale, where (1) = strongly disagree; (2) = disagree; (3) = neutral; (4) = agree and (5) = strongly agree.

Table 2. Measurement items

Item code	Item
	Performance Expectancy
PE1	QR-code mobile payment would be useful to conduct my payment.
PE2	Using QR-code mobile payment would enable me to accomplish payment more quickly.
PE3	Using QR-code mobile payment would increase my productivity.
PE4	Using QR-code mobile payment would increase my chances of achieving things that are important to me.
PE5	Using QR-code payment would make it easier for me to make payment.
	Effort Expectancy
EE1	My interaction with QR-code mobile payment would be clear and understandable.
EE2	It would be easy for me to become skilful at using QR-code mobile payment.
EE3	I would find QR-code mobile payment easy to use.
EE4	Learning to use QR-code mobile payment would be easy for me.
EE5	Interacting with the QR-code mobile payment does not require a lot of my mental effort.
EE6	I think it is easy to get the QR-code mobile payment to do what I want it to do.
	Social Influence
SI1	I will adopt QR-code mobile payment if people who influence my behaviour think that I should use it.
SI2	I will adopt QR-code mobile payment if people who are important to me think that I should use it.
SI3	I will adopt QR-code mobile payment if people whose opinions that I value prefer that I use it.
SI4	Friend's suggestion and recommendation will affect my decision to adopt QR-code mobile payment.
SI5	Family members/relatives will have an influence on my decision to adopt QR-code mobile payment.
SI6	I will adopt QR-code mobile payment if my colleagues/classmates use it.
SI7	Information from mass media (e.g. TV, Radio, newspapers, internet) will influence my decision to adopt QR-code mobile payment.
SI8	I would adopt QR-code mobile payment if the service is widely used by people in my community.
	Facilitating Conditions
	I have the resources necessary to use QR-code mobile payment (e.g. smartphones, internet services, and secured applications).
FC1	
FC2	I have the knowledge necessary to use QR- code mobile payment.
FC3	QR-code mobile payment is compatible with other technologies I use.
FC4	I can get help from others when I have difficulties using QR-code mobile payment.
FC5	Using QR-code mobile payment fits well with the way I like to make payment effectively.
FC6	Using QR-code mobile payment fits into my lifestyle.
	Hedonic Motivation
HM1	Using QR-code mobile payment would be fun.
HM2	Using QR-code mobile payment would be enjoyable
HM3	Using QR-code mobile payment would be entertaining
HM4	Using QR-code mobile payment would be pleasant
HM5	Using QR-code mobile payment would be exciting.
HM6	Using QR-code mobile payment would be interesting.
	Price Value
PV1	With the smartphone fee I need to pay, QR- code mobile payment can be beneficial to me.

continued on next page

Table 2. Continued

Item code	Item
PV2	With the mobile internet fee I need to pay, QR- code mobile payment can be worthwhile to
	me.
PV3	With the smartphone maintenance fee I need to pay, QR-code mobile payment is good value for money.
PV4	QR-code mobile payment can provide me better value than other payment methods (e.g. cash, credit/debit card).
PV5	Overall, the use of QR-code mobile payment will deliver me good value.
	Habit
HT1	The use of mobile phones for payment has become a habit for me.
HT2	I am addicted to use mobile phones for general payment.
HT3	I must use mobile phones for payment.
HT4	Using mobile phones for payment has become natural to me.
HT5	When faced with payment activities, using mobile phones for payment is an obvious choice for me
HT6	Using mobile phones for payment is something I do without planning.
	Personal Innovativeness
PI1	If I heard about new information technology, I will try to use it.
PI2	In my social circle, I am usually the first to try out new information technology.
PI3	I know more than my friends on new information technology.
PI4	I like to experiment with new information technology.
PI5	I enjoy taking chances in using new
	information technology.
PI6	In general, I do not want to try out new information technology.
	Behavioural Intention
BI1	Given the chance, I intend to make payment by using QR-code mobile payment.
BI2	Given the chance, I will always try to make payment by using QR-code mobile payment in my personal life.
BI3	I plan to use QR-code mobile payment in the near future.
BI4	I predict that I will use QR-code mobile payment in the near future
BI5	I believe my interest towards QR-code payment will increase in the near future.

5. RESULTS

The items were first tested for normality and internal consistency. Table 3 illustrates the descriptive statistics, construct reliability (CR), and average variance extracted (AVE) for the variables. The results indicated that the univariate normality assumptions are not violated in the present study. Normality assessment is accepted if the ratio of skewness lower than ±1.00. The measurement model of the nine variables yielded good measurement fit with $\chi 2/DF = 2.08$ ($p<0.001$), CGI =0.94, RMSEA = 0.05, and SRMR = 0.05. The CR exceeds the acceptable value at 0.70, and AVE exceeds the threshold of 0.50. This indicates that the measurement model has satisfactory convergent validity.

Table 3. Descriptive statistic, normality, and internal consistency

Variable	Items	Mean	SD	Skewness	CR	AVE
Performance Expectancy	5	3.72	0.57	0.02	0.77	0.52
Effort Expectancy	6	3.77	0.52	0.17	0.75	0.50
Social Influence	8	3.47	0.57	0.23	0.81	0.53
Facilitating conditions	6	3.67	0.56	0.05	0.76	0.51
Hedonic Motivation	6	3.50	0.64	0.05	0.86	0.67
Price Value	5	3.50	0.60	0.13	0.86	0.67
Habit	5	3.28	0.72	0.17	0.77	0.53
Personal Innovativeness	6	3.49	0.63	0.28	0.81	0.52
Behavioural Intention	5	3.56	0.67	0.25	0.86	0.67

Table 4, the variance extracted from each variable is all above its squared correlation with other variables. Consistent with past literature guidelines, these results explain adequate evidence for the measurement model's discriminant validity. When the value is closer to +1 or -1, it indicates that there is a stronger linear relationship between the two variables. A low value means that it is highly unlikely for the variable to be correlated with the other variable. Thus, it can be irrelevant. However,

Table 4. Correlation Matrix for the Overall Measurement Model

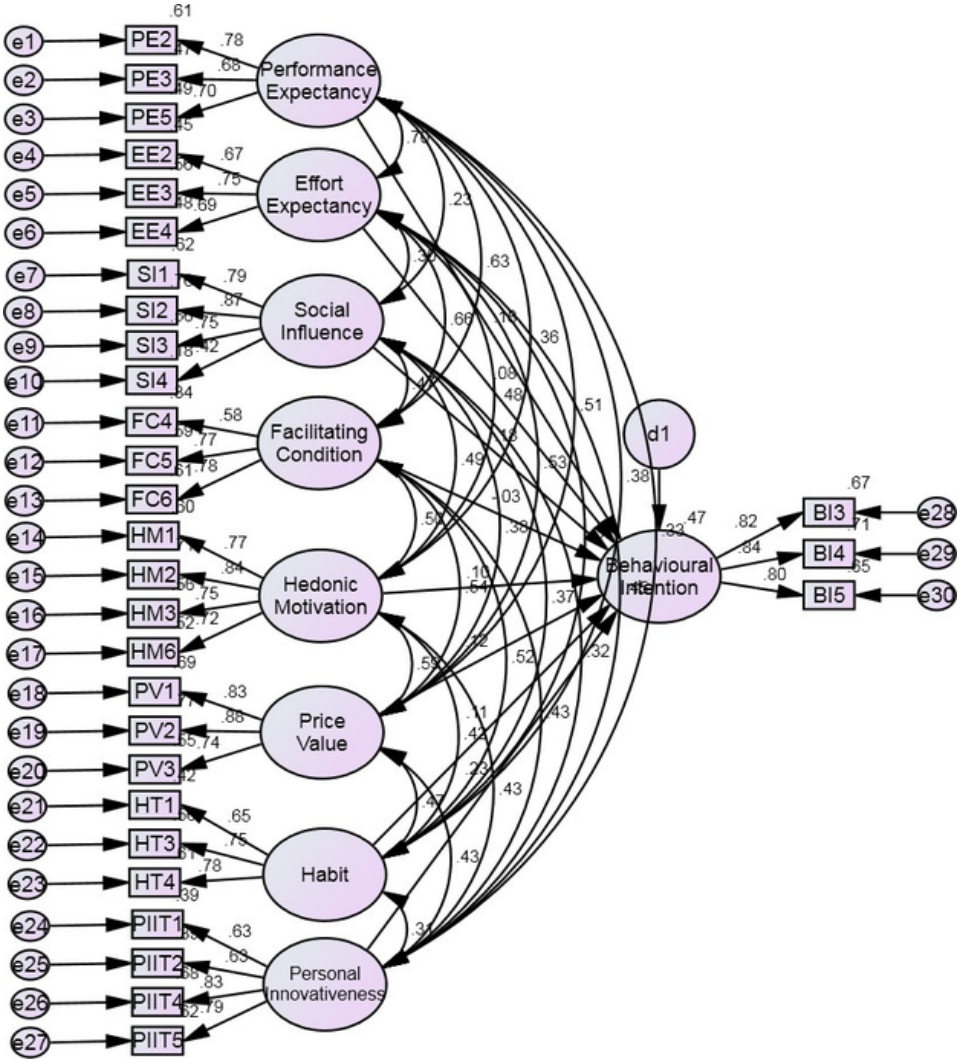
	PV	PE	SI	FC	PITT	EE	BI	HM	HT
PV	**0.819**								
PE	0.505	**0.723**							
SI	0.383	0.228	**0.727**						
FC	0.538	0.634	0.470	**0.715**					
PIIT	0.433	0.334	0.322	0.432	**0.722**				
EE	0.527	0.696	0.300	0.656	0.448	**0.705**			
BI	0.523	0.479	0.441	0.496	0.500	0.501	**0.821**		
HM	0.588	0.360	0.486	0.497	0.427	0.477	0.497	**0.774**	
HT	0.468	0.383	0.367	0.524	0.310	0.372	0.432	0.418	**0.729**

Note: EE= Effort expectancy, FC=Facilitating condition, HM= Hedonic motivation, PV= Price value, HT=Habit, BI= Behavioural intention, PE=Performance expectancy, and SI= Social influence

it does not mean that high value is good, because it means that the variable is highly correlated with some other variables. Thus, high chance it is redundant.

The research model (refer to Figure 2) was tested through SEM via the use of AMOS. The statistical values of the indexes are: CMIN (766.84), $\chi 2$/DF (2.078), GFI (.900), CFI (.935), RMSEA (.049) and SRMR (.0470). These values reveal that the structural model developed for this study is well fitted.

Figure 2. Research model result



In total, eight hypothesised relationships are examined. Behavioural intention is used where dependent variables and independent variables include performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, habit, price value, and personal innovativeness in information technology. Based on the significant parameter estimates results, the performance expectancy, social influence, price value, habit, and personal innovativeness in

information technology are statistically significant in explaining the behavioural intention, thus confirming H_1, H_3, H_6, H_7, and H_8. The effort expectancy, facilitating conditions and hedonic motivation are not statistically significant, and consequently hypotheses H_2, H_4 and H_5 are not supported (refer to Table 5).

Table 5. Results of hypotheses testing

Hypotheses	Path Coefficient (β)	P-value	Result
H_1: Performance expectancy has a positive effect on behavioural intention to adopt QR-code payment.	0.234	0.017*	Supported
H_2: Effort Expectancy has a positive effect on behavioural intention to adopt QR-code payment.	0.113	0.176	Not supported
H_3: Social influence has a positive effect on behavioural intention to adopt QR-code payment.	0.189	0.001**	Supported
H_4: Facilitating conditions has a positive effect on behavioural intention to adopt QR-code payment.	-0.045	0.359	Not supported
H_5: Hedonic motivation has a positive effect on behavioural intention to adopt QR-code payment.	0.117	0.054	Not supported
H_6: Habit has a positive effect on behavioural intention to adopt QR-code payment.	0.110	0.033*	Supported
H_7: Price Value has a positive effect on behavioural intention to adopt QR-code payment.	0.154	0.031*	Supported
H_8: Personal innovativeness in information technology has a positive effect on behavioural intention to adopt QR-code payment.	0.225	***	Supported
Note: Two-tailed t tests are performed. *p < .05; **p < .01; ***p < .001.			

6. DISCUSSION

The first result shows the performance expectancy (β=0.234, $p<0.05$) has a positive and significant influence on behavioural intention. Thus, this study accepted H_1. The finding is consistent with most of the past studies (e.g. Tan et al., 2014; Thakur & Srivastava, 2014; and Yan & Yang, 2015) which found that the perception of performance expectancy is positively related to behavioural intention to use the mobile payment in developing countries.

Second, the result shows that effort expectancy is β=0.113 and $p>0.05$. Thus, H_2 is not supported. The findings contradict with most of the past studies (e.g. Leong et al., 2013; Tan et al., 2014; and Balachandran & Tan, 2015) conducted on mobile payment in Malaysia where consumers would accept the new innovation if the system is effortless.

Third, the positive effect of social influence on behavioural intention (H_3) is supported in this study (β=0.189, $p<0.05$). This implies that the influences perceived from social groups like family and peers have positive effects on intention behaviour. This result supports the results of previous studies (e.g. Yang et al., 2012; Tan et al., 2014, and Slade et al., 2015) conducted in the field of mobile payment adoption in Malaysia.

Fourth, the final result of H_4 is not supported (β=-0.045, $p>0.05$). Several studies (e.g. Slade et al. 2014; Oliveira et al. 2016; and Khalilzadeh et al., 2017;). Slade et al. (2014) also validate that the facilitating conditions are not a determinant of the behavioural intention state that FC has an

insignificant influence on BI to use mobile payment because most of the respondents are non-users and therefore they are unable to determine what resources needed to use mobile payment.

Fifth, the result shows that H_5 (β=0.110, $p<0.05$) is not supported. Based on the early review, habit construct has been excluded in a number of studies (e.g. Koenig-Lewis et al., 2015; Slade et al., 2015; and Oliveira et al., 2016) because habit is less applicable in a relatively new technology that has yet to gain widespread use among consumers to form a used habit.

Sixth, H_6 is found to be not statistically significant (β= 0.117, $p>0.05$). The finding is consistent with earliest study of Oliveira et al. (2016). The reason for not having a relationship between hedonic motivation and behaviour intention due to the pleasures obtained from using mobile payment services which might stir risky emotions toward financial facilities. Even the previous studies conducted by Ooi et al. (2011), Wong et al. (2016), and Lee et al. (2017) find that consumers in Malaysia are highly interested in hedonic factors, however it is more to entertainment-based products such as broadband, mobile TV, and mobile shopping.

Seventh, price value has a positive effect on behavioural intention to adopt QR-code payment. The result shows that β= 0.154 and $p<0.05$, thus H_7 is supported. Venkatesh et al. (2012) highlight the importance of price value in consumers' decision making regarding to QR-code mobile payment adoption.

Finally, personal innovativeness in information technology has a positive effect on behavioural intention to adopt QR-code payment (β=0.225, $p<0.05$), thereby confirming H_8. The finding is consistent with literatures (Tan et al. 2014; Oliveira et al. 2016; and Patil et al., 2020), which illustrates the important role of innovativeness towards behavioural intention for mobile payment in Malaysia and various contexts.

7. CONCLUSION

Consumers' behavioural intentions are recognised as one of the most vital elements that leads to any mobile payment providers' success and sustainability. Unlike most prior research that focuses mainly on the systems' performance, this study took a different approach to examine whether habit, hedonic motivation and price value had a significant influence on consumers' behavioural intention in the mobile payment industry. This study contributes to examine the adoption intention behaviour of innovation, taking QR-code mobile payment technology. This study's first theoretical implication is to fill the gap by exploring all UTAUT2 constructs in the mobile payment context. This study's second implication is to fulfill the previous research gaps by enhancing the adoption of QR-code mobile payment products and services. This study also provides further theoretical support for the role of performance expectancy, social influence, habit, price value, and personal innovativeness in the adoption of QR-code mobile payment systems.

This study presents one of the few empirical works investigating the role of consumer innovativeness and thus validates the inclusion of personal innovativeness as constructed in mobile payment adoption research. Findings from this study provide valuable insights for mobile payment application developers and mobile payment marketing teams. Since performance expectancy is reported to impact behavioural intention significantly, mobile payment providers should pay utmost attention to performance expectancy to boost the adoption rate. It is believed that the intention tends to be higher when QR-code mobile payment is found to provide more features or abilities that could increase the performance in transactions.

From the practical perspective, taking expected performance into account during the implementation of a QR-code mobile payment is possible through the use of several approaches. The high levels of performance expectation recommend that service providers continue investing time and money to create awareness and educate consumers about the usefulness, convenience, and advantages of the service. This would further lead to increasing acceptance of QR-code mobile payments apps among the potential users. For effective integration of the QR-code mobile payment technology into a

particular industry (restaurant, retailers etc.), industry marketers and technology vendors must jointly publicise the technology as an innovative but safe alternative to the status quo payment methods. Social influence is also an important variable highlighted in this study. Given that social influence is reported to have a significant impact on behavioural intention, merchants and application developers should consider approaches that capitalise on the social influence among consumers. In this realm, opinions shared by friends, relatives and superiors are influential in the recognition, promotion, and successful adoption of QR-code mobile payment technology. This study attributes the importance of the current high level of interconnection between individuals on account of the rise of mobile communication technologies. Besides that, consumers also tend to comply with the opinions of salient others. This social influence could be leveraged by engaging in marketing campaigns with opinion leaders while intending a snowball effect for the realisation of a more positive perception towards the technology.

Though this study reveals several noteworthy findings, there are certain limitations. Firstly, this study's main focus is on the effects of UTAUT2 and personal innovativeness in information technology on behavioural intention to adopt QR-code mobile payment adoption in Sarawak. Besides, this study does not examine other factors that may consider important to the adoption of mobile payment, such as trust, perceived security and risk. By excluding such variables, this study might not have captured the complete domain of behavioural intention to adopt QR-code mobile payment. Secondly, participants in this study are all from a typically collectivist country, and cultural differences in individualism and collectivism have been shown to impact technology usage behaviour. Thus, the findings in this study may not be generalisable to individualistic countries. Finally, the convenience sampling approach was adopted, yet, non-random sampling techniques are associated with less generalisability. The definition of the population is restricted due to resource constraints and the availability of adequate sampling frames. The respondents in the study are consumers who have visited specific shopping malls during the survey period. Therefore, the sample here might not be representative of other consumers who visit the shopping mall during other periods of the year. Hence, the results might only reflect the group from which the sample is taken.

The future study could replicate current study setting to examine customers' intention and behaviour towards different technologies (e.g. e-learning, online shopping, wearable technology, mobile government, mobile health services, and mobile payment) in different contexts (education, retailers, government, healthcare, hotels). Given that the multifaceted nature of QR-code mobile payment, there could be possibilities that other factors play a role in supporting behavioural intention to adopt QR-code mobile payment. Future research could extend the model by incorporating perceived risk, security, or trust constructs to examine consumers' behavioural intention toward QR-code mobile payment. Follow-up studies should also construct a more comprehensive model by incorporating moderating variables to predict adoption intentions such as age, gender, and experience. Future studies can also focus on consumers' actual or continuance usage of QR-code mobile payment. Additionally, this study is a cross-sectional study. Longitudinal research of this kind would also test the validity of the model over time and see how its predictive capacity holds when effects on usage are also hypothesised.

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