MOVING TOWARDS CASHLESS SOCIETY: MALAYSIAN CONSUMERS INTENTION TO ADOPT NEAR FIELD COMMUNICATION (NFC) - ENABLED MOBILE PAYMENT

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UNIVERSITI SAINS MALAYSIA

2022

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by

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Thesis submitted in fulfilment of the requirements
for the degree of
Doctor of Philosophy

October 2022

DEDICATION

I dedicate my precious Doctoral thesis to:

My mother, Mdm. Karuppiah Uma Maheswari, who stood by my side throughout the ups and downs of my life and my PhD journey. Despite the many obstacles she faced, my mother continuously supported me emotionally and financially throughout my life and PhD studies. I cannot thank you enough for all that you have done for me Maa. I love you, Maa.

My late father, Mr. Balachandran, who loved me unconditionally and fought for me until his last breath. This achievement of mine was his last wish. Paa, I wish you were here to witness the biggest achievement in my life. Thank you for everything, Paa.

I love you.

My guru, Prof. Garry Tan Wei Han who sparked my research interest in the area of mobile payment. He has never failed to push me to the next stage in life. Thank you so much Sir — you are one in a million.

Last but not least, Goddess Saraswathi, who continuously showered me with her blessings. It would not be possible for me to achieve this great milestone in academia without her blessing.

ACKNOWLEDGEMENT

I am grateful to each and every person who made this research possible. First and foremost, I would like to thank my supervisors Dr. Khairul and Prof. Ramayah for their continuous support and guidance. It was my good luck to have both of them as my supervisors. A special mention to Prof. Ramayah, who taught me many new things about research throughout my PhD journey. Without him, I would not have successfully completed my research. Next, I would like to thank my mother Mdm. Karuppiah Uma Maheswari, my late father Mr. Balachandran, and brother Vignnesh Naidu for their love, prayers, support, encouragement, understanding, patience, and tolerance throughout my PhD journey. I am nothing without them; they are the reason I am here today. My gratitude also goes to all my other family members for their various forms of support in my precious PhD journey. Next, I extend my appreciation to all the target respondents who took part in my study. Thank you for giving me your valuable time. I truly appreciate your contribution in making this research a success. I would also like to take this opportunity to thank my fellow researchers from Universiti Sains Malaysia, Ms. Gowri and Ms. Yeap, for sharing their research knowledge with me and motivating me throughout my PhD journey. Both of you are true research buddies. Last but not least, I sincerely express my appreciation to all members of Universiti Sains Malaysia, specifically those from the School of Management, for guiding and supporting me throughout my PhD journey. A special thank you to Pn. Robitah for always being there for me. I am truly grateful to all of you.

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LIST OF SYMBOLS

f^2	Effect Size
Q^2	Predictive Relevance
Q^2 predict	PLS Predict
R^2	Coefficient of Determination

LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
CA	Cronbach Alpha
CB-SEM	Covariance-based
CMB	Common Method Bias
CR	Composite Reliability
DOI	Diffusion of Innovation
HTMT	Heterotrait-Monotrait Ratio of Correlations
LM	Linear Regression Model
MAE	Mean Absolute Error
MTAM	Mobile Technology Acceptance Model
NFC	Near Field Communication
PLS	Partial Least Square
PLS-SEM	Partial Least Square-Structural Equation Modelling
QR	Quick Response
RFID	Radio Frequency Identification
RMSE	Root Mean Square Error
SEM	Structural Equation Modelling
S-O-R	Stimulus-Organism-Response
TAM	Technology Acceptance Model
UTAUT	Unified Theory of Acceptance and Use Technology
VAM	Value based Adoption Model
VIF	Variance Inflation Factor

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KE ARAH MASYARAKAT NIRTUNAI: NIAT PENGGUNA MALAYSIA UNTUK MENERIMA PEMBAYARAN MUDAH ALIH MENERUSI KOMUNIKASI MEDAN DEKAT (NFC)

ABSTRAK

Perkembangan teknologi yang berterusan, khususnya teknologi mudah alih, telah membawa banyak perubahan kepada kehidupan manusia, terutamanya berikutan kemunculan virus pembawa maut Covid-19. Sistem tanpa sentuh merupakan perkara yang dicari-cari oleh setiap individu pada hari ini dalam setiap perkara yang melibatkan mereka. Peralihan kepada masyarakat nirtunai dengan memanfaatkan pembayaran mudah alih telah menjadi satu agenda penting bagi negara-negara di serata dunia, malah sebelum pandemik lagi. Masyarakat nirtunai juga merupakan agenda penting negara Malaysia; walaubagaimanapun, kadar kemajuan sistem tersebut agak perlahan. Kebanyakan rakyat Malaysia masih bergantung kepada sistem tunai, manakala mereka yang memilih sistem pembayaran mudah alih cenderung menerima pakai pembayaran mudah alih berasaskan Respon Pantas (*QR*) berbanding pembayaran mudah alih berasaskan Komunikasi Medan Dekat (*NFC*), walaupun sistem *NFC* lebih unggul dari segi keselamatan, kemudahan, kemesraan pengguna, dan lain-lain. Oleh itu, kajian ini bertujuan memberi tumpuan terhadap peralihan pengguna Malaysia kepada masyarakat nirtunai dengan memanfaatkan pembayaran mudah alih berasaskan *NFC*. Untuk mencapai tujuan tersebut, Teori Penyebaran Inovasi lanjutan serta Teori Kepercayaan berdasarkan Institusi, Teori Eksternaliti Rangkaian, Model Penerimaan berdasarkan Nilai, Teori *Bias Status Quo*, dan Teori Rangsangan-Organisme-Gerak Balas (*S-O-R*) digunakan untuk membangunkan model kajian ini. Model kajian terdiri daripada enam

pemboleh ubah tidak bersandar (Persepsi Kelebihan Relatif, Persepsi Kerumitan, Persepsi Keserasian, Persepsi Jaminan Struktur, Persepsi Eksternaliti Rangkaian dan Persepsi Kesedaran Teknologi), satu pemboleh ubah pengantara (Persepsi Nilai), satu pemboleh ubah penyederhana (Persepsi Kos Bertukar), dan satu pemboleh ubah bersandar (Niat untuk Menerima). Borang soal selidik dalam talian digunakan dalam kajian ini untuk mengumpul maklum balas responden tersasar. Sebanyak 400 maklum balas telah dikumpul, dari mana 318 maklum balas sesuai digunakan untuk analisis. Data kajian dianalisis menggunakan pendekatan Pemodelan Persamaan Berstruktur-Kuasa Dua Terkecil Separa (*PLS-SEM*). Daripada 14 hipotesis yang dicadangkan, 11 disokong dan tiga tidak disokong. Kesemua pemboleh ubah tidak bersandar, melainkan Persepsi Kerumitan, dibuktikan memiliki hubungan yang signifikan dengan pengantara, iaitu Persepsi Nilai. Pada masa yang sama, Persepsi Nilai telah dibuktikan sebagai pengantara hubungan di antara semua pemboleh ubah tidak bersandar dengan pemboleh ubah bersandar, melainkan Persepsi Kerumitan. Selain itu, Persepsi Kos Bertukar didapati tidak signifikan sebagai penyederhana hubungan di antara Persepsi Nilai dan Niat untuk Menerima dalam konteks kajian ini. Hasil kajian ini diharapkan menjadi titik rujukan bagi kajian masa hadapan dalam bidang ini serta membantu penggubal polisi dalam industri untuk menghasilkan rancangan dan strategi yang akan meningkatkan kadar penerimaan kaedah pembayaran inovatif ini.

MOVING TOWARDS CASHLESS SOCIETY: MALAYSIAN CONSUMERS INTENTION TO ADOPT NEAR FIELD COMMUNICATION (NFC)-ENABLED MOBILE PAYMENT

ABSTRACT

The continuous advancement in technology, specifically mobile technologies, has brought many changes to human life, especially after the rise of the deadly Covid-19 virus. Contactless systems have become something that everyone today looks for in everything they take part in. The shift to a cashless society by leveraging mobile payment has become an important agenda for many countries across the globe, even before the pandemic. It is also an important agenda for Malaysia; nevertheless, the technology's progress rate is relatively slow. The majority of Malaysians are still cash-dependent, while those who opt for mobile payment tend to choose quick response or QR-based mobile payment over near field communication or NFC-based mobile payment, despite the latter's superiority in terms of safety, convenience, user friendliness, and more. Hence, this study aimed to address Malaysian consumers' transition to a cashless society by leveraging NFC-enabled mobile payment. To achieve this, an extended DOI Theory as well as the Institutional-based Trust Theory, Network Externalities Theory, Value-based Adoption Model, Status Quo Bias Theory, and Stimulus-Organism-Response (S-O-R) theory were utilised to develop the model of the study. The model of this study was made up of six independent variables (Perceived Relative Advantage, Perceived Complexity, Perceived Compatibility, Perceived Structural Assurance, Perceived Network Externality, and Perceived Technology Awareness), a mediating variable (Perceived Value), a moderating variable (Perceived Switching Cost), and a

dependent variable (Intention to Adopt). The online survey questionnaire was adopted in the study to collect data from the target respondents. In total, 400 responses were collected, of which 318 qualified for data analysis. The data of the study was analysed using the partial least squares structural equation modelling (PLS-SEM) approach. Out of the 14 proposed hypotheses, 11 were supported and three were not. Except for Perceived Complexity, all other independent variables proved to have a significant relationship with the mediator, Perceived Value. Similarly, except for Perceived Complexity, Perceived Value was established as a mediator of the relationships between all other independent variables and the dependent variable. Switching cost, on the other hand, was found to be insignificant in moderating the relationship between Perceived Value and Intention to Adopt in the context of this study. The outcomes of this study are expected to be a reference point for future research works in the field as well as to assist policymakers in the industry in formulating plans and strategies that boost the adoption rate of this innovative payment method.

CHAPTER 1

INTRODUCTION

1.1 Introduction

The focus of Chapter One is on the introduction of the research. The chapter begins with the background of the study, followed by the establishment of the problem statement, introduction of the study variables, and development of research objectives and research questions. The chapter also addresses the scope of the study, significance of the study and the definition of the key variables of the study. Finally, the chapter concludes by outlining the thesis' organisation.

1.2 Background of the Study

The continuous advancement in technology, specifically mobile technologies, has brought significant changes to human life. In fact, mobile technologies have replaced many conventional day-to-day activities that demand humans to be physically present; today, most mobile-based services do not require physical presence to carry out daily tasks (Ying & Mohamed, 2020). For many, the mobile phone has become an integral part of their life. It is the first thing they see in the morning when they wake up and the last thing they see before they go to sleep (Toh, Howie, Coenen & Straker, 2019). Mobile phones are no longer only used for communication purposes; instead, they have become a part of everything individuals do in day-to-day life. The advances in mobile technologies also have driven many significant changes in the economy worldwide (See & Goh, 2020).

Mobile technologies have influenced various industries across the globe to deliver innovative mobile-based offerings; Malaysia is not an exception (Fadhil, Vafaei-Zadeh & Ramayah, 2019). For example, the inception of mobile technology led the retail industry to come up with mobile shopping features (Kaur & Soch, 2021), the food industry to come up with mobile food ordering services (Taylor, 2020), the banking industry to come up with the mobile banking options (Shankar, Jebarajakirthy & Ashaduzzaman, 2020), the education industry to come up with mobile learning platforms (Shukla, 2021), and so on. The latest addition to this list is the continuously evolving payment industry (Hajazi, Chan, Ya'kob, Siali & Latip, 2021; Lau et al., 2021). Payment methods have been developing from time to time to suit the commerce environment. The Barter system was the first payment method in human history and was eventually replaced by other payment instruments as humans evolved (Taskinsoy, 2020).

The payment system in Malaysia is made up of various instruments, such as bank notes and coins, bank cards (i.e., debit and credit cards), and e-money. Among these, bank notes and coins are the most preferred and commonly used payment method (Ying & Mohamed, 2020), not only by Malaysians but also by consumers from across the globe (Kailas 2020, Guttmann, Pavlik, Ung & Wang, 2021; Mukherjee, Chatterjee & Saha, 2020). However, in recent days, many countries have started to shift to a cashless society by leaving behind the use of cash — Malaysia is one such country (Ying & Mohamed, 2020).

Malaysia's attempts to go cashless started in the year 2011 when Bank Negara Malaysia launched the Financial Sector Blueprint 2010 (Fadhil et al., 2019). Indeed, moving towards a cashless society by leveraging electronic payments is the primary focus of the Digital Malaysia Economy Blueprint 2021-2030 as well the

Financial Sector Blueprint 2011-2020 (Abdullah et al., 2020; Azmana et al., 2020). Specifically, Malaysia intends to become a cashless society by the year 2050; however, its progress towards this goal can be inferred as relatively slow. Cash is still 'king' in Malaysia, where 92.5% of economic transactions are based on cash while only 7.5% employ cashless payment methods (Phoong, Phoong, Moghavvemi & Yeong, 2020; Karim, Yusoff, Ismail, Mazlan, Ghani & Muhammad, 2021). Currently, the number of cashless transactions per capita in Malaysia is 44; Bank Negara Malaysia aims to increase this number to 200 in the next 10 years (Chan, Leong & Yiong, 2020).

As mentioned earlier, the payment system in Malaysia is enriched with various cashless payment instruments, yet Malaysia focuses on mobile payments to achieve its cashless society goal (Abdullah et al., 2020, Fadhil et al., 2019; Ab Hamid & Cheng, 2020; Ying & Mohamed, 2020). Malaysia's migration towards a cashless society by leveraging on mobile payment would benefit Malaysia in many ways (Yan, Tan, Loh, Hew & Ooi, 2021). Hence, it is crucial to carry out studies to identify the factors that lead Malaysian consumers to adopt mobile payments, as these findings would be useful for various parties in the mobile payment ecosystem in Malaysia to draft and implement policies and strategies related to the adoption of this innovative payment method.

According to Octavius and Antonio (2021), the successful adoption of an innovation or technology highly depends on potential adopters' willingness to do so. In other words, adoption is demand-oriented rather than supply-oriented. As such, it is crucial to predict the diffusion of an innovation or technology from the perspective of factors that have the ability to influence individuals' decision towards its adoption. According to Yoon, Lim and Park (2020), the basic characteristics that an adopter

looks for in an innovation or technology are obviously the benefits it delivers, its conformance with their self, and its ease of use.

Any innovation or technology that is deemed to be less useful, complex, and incompatible is less likely to be adopted by potential adopters. Like all other innovations, these attributes of innovation are also expected to play a significant role in the adoption intention of near field communication-enabled (hereafter NFC-enabled) payment among consumers in Malaysia. Hence, it is worthy to investigate whether these factors are influential and significant in the context of the adoption of this innovative payment method. On the other hand, structural assurance is a factor that has been receiving much attention in recent times in terms of the adoption of new innovation or technology. As technology keeps evolving, new inventions and innovations are entering the consumer market on a daily basis. However, consumers are not embracing each and every innovation or technology that enters the market. Instead, they choose to adopt technologies that assure their security. This also applies to the adoption of mobile payment (Choi, Park, Kim & Jung, 2020). According to Aziz, Wen, Azman and Sufian (2020) and Hee, Ying, Kowang and Ping (2020), security concern is the main factor that holds Malaysians back from embracing the mobile payment method. The significance of structural assurance has been tested and proven in the context of various emerging mobile-based services, such as mobile contact tracing apps (Ukpabi, Olaleye & Karjaluoto, 2021), mobile money (Baganzi & Lau, 2017) and mobile banking (Mahad, Mohtar & Othman, 2015) in both local and international settings. Hence, its crucial to test its relevance in terms of the adoption of NFC-enabled mobile payment among consumers in Malaysia.

Similarly, network externality is another factor of interest when studying the adoption intention towards new innovation or technology. According to Cheng (2020), the worth of an innovation or technology increases with the number of consumers using it as well as the number of complementary services related to it. Such network externality is essential for an innovation or technology to grow and sustain in the market. If an innovation or technology is not embraced or used by many, then the chances of it being adopted by other members of the public are relatively lower (Lee & Kim, 2020; Cheng, 2020). In this regard, a lack of network externality could be the reason NFC-enabled mobile payment is not adopted by consumers in Malaysia. Therefore, it is necessary to study this variable in the context of NFC-enabled mobile payment adoption among consumers in Malaysia.

In the same vein, awareness is another factor that plays an important role in boosting the adoption intention of a new innovation or technology. The marketplace is flooded with various innovations and technologies. Anything that fails to highlight its presence in the market may remain unnoticed among the crowd and subsequently be forced to quit the market without much growth (Singh & Sinha, 2020; Baabdullah, 2020). In the context of NFC-enabled mobile payment in Malaysia, the low awareness among the consumers could be a major factor that contributes to the low adoption rate of this innovative payment method. As such, it is pivotal to study the significance of awareness in the adoption intention of NFC-enabled mobile payment among consumers in Malaysia.

Apart from that, perceived value has recently received much attention in technology adoption studies due to its significance in mediating the adoption intention of new innovations or technology. Consumers assign value to an innovation or technology by evaluating the benefits they enjoy and the sacrifices they need to

make; this value determines their likelihood of adopting the particular innovation or technology (Shelvia, Prayitno, Kartono & Sundjaja, 2020). According to Wibowo and Ahmad (2020), Shelvia, Prayitno, Kartono and Sundjaja (2020) and Lin, Wu, Hsu and Chou (2012), perceived value is an important variable to understand consumers' behaviour towards an innovation or technology. Hence, examining the adoption of NFC-enabled mobile payment from the perspective of perceived value may provide new insights into the adoption intention of this innovative payment method among Malaysian consumers.

Malaysian consumers' transition from a cash-based to cashless society by leveraging mobile payment is considered a switching process rather than a shifting process, since the transition is from one form of payment to another (Loh, Lee, Tan, Ooi & Dwivedi, 2020). According to Kim, Byon and Choi (2020), switching cost is a great barrier in any adoption or switching process. It has the ability to reverse consumers' intention and make them stick to their existing practice or state (Singh & Rosengren, 2020). The switching cost faced by consumers can be either monetary or non-monetary (Chuah, Rauschnabel, Marimuthu, Thurasamy & Nguyen, 2017). Thus, it is important to identify if switching cost is what stops Malaysian consumers from adopting NFC-enabled mobile payment despite its perceived value.

1.2.1 Leveraging Mobile Payments for a Cashless Malaysian Society

In order to encourage Malaysians to use mobile payments, the Malaysian government has introduced various strategies and initiatives. For example, recently, the Malaysian government credited a sum of RM 80 into the mobile wallet of eligible consumers in two phases. In the first phase, RM 30 was credited while in the second phase, RM 50 was credited. This effort was taken to stimulate the mobile payment

habit among Malaysian consumers (Lui, Zainuldin, Yii, Lau & Go, 2021). Besides, the Malaysian government also introduced an initiative under the Strategic Programme to Empower the People and the Economy (Pemerkasa), which provides a one-off cash aid of up to RM300 for consumers from the B40 category to purchase a mobile phone. This effort was taken by the Malaysian government to help consumers without mobile phones own one so that they can utilise mobile-based services, including the payment function (The Sun Daily, 2021).

In addition, the Malaysian government has also collaborated with various players in the industry to launch a campaign called MyBaikHati. Under this campaign, unused mobile phones are collected from various parties in the industry, including the general public, to be refurbished and donated to rural consumers with financial difficulties. The aim of this campaign is to equip the consumers without the capacity to own a mobile phone with one, so that they will be able to utilise mobile-based services such as the new payment norm (Berita Harian Online, 2021). On the other hand, the Malaysian government is also working closely with the Malaysian Communications and Multimedia Commission to improve internet and broadband coverage in all areas in Malaysia under an initiative called Jalinan Digital Negara (Siew, Hoe & Fun, 2020). The Internet plays an important role in switching to a cashless society, since high-speed internet is crucial for the functioning of electronic payments, including mobile payments (Rahadi, Nainggolan, Afgani, Yusoff, Muhammad, Angelina & Farooq, 2020). Evidently, the Malaysian government is trying its best to come up with as many initiatives as possible to stimulate Malaysian consumers to transition to a cashless society by adopting the mobile payment method. Unfortunately, Malaysians are yet to gain their momentum towards this journey.

1.2.2 Overview of Mobile Payment in Malaysia

According to recent statistics, the percentage of mobile payment usage in Malaysia was 40% as of the year 2020 (New Straits Times, 2021a). All the banking institutions in Malaysia support the mobile payment initiative and provide consumers the necessary infrastructure and services to engage in mobile payment transactions. The mobile payment industry in Malaysia is also filled with quite a number of non-banking mobile payment service providers and organisations (Chan, Leong & Yiong, 2020).

Currently, there are two types of mobile payments in practice in Malaysia, i.e., NFC-based mobile payment and QR code-based mobile payment (Aziz, Wen, Azman, & Sufian, 2020). TnG wallet, GrabPay and Boost are examples of mobile payment service providers in Malaysia that allow consumers to make QR-code based mobile payments (Yan et al., 2021), while Apple Pay, Samsung Pay, May-bank Pay, and CIMB Pay are examples of service providers in Malaysia that allow consumers to make NFC-enabled mobile payments (Abdul Aziz, Wen, Azman & Sufian, 2020).

NFC-based mobile payment entered the Malaysian payment system much earlier than QR mobile payment. In fact, Malaysia is the first country where VISA did its pilot testing for NFC-based mobile payment (Leong, Hew, Tan & Ooi, 2013). On the other hand, the QR-based mobile payment is the latest addition to mobile payment systems in Malaysia, yet it is the most popular, widely accepted, and highly used mobile payment option among Malaysians (Yan et al., 2021). Conversely, NFC-based mobile payment is not well-received by Malaysians despite its superiority in terms of safety and convenience over QR-based mobile payment (Ng, 2019, Yan et

al., 2021; Reiting, Mladenow, Strauss & Kotsis, 2020). Table 1.1 shows the key differences between NFC-based mobile payment and QR-based mobile payment.

Table 1.1: NFC-based mobile payment vs QR-based mobile payment

Attributes	NFC-based Mobile Payment	QR Code based Mobile Payment
Type of payment	Contactless payment method (Srivastava, Mahendar & Vandana, 2021)	Contactless payment method (Alena, 2021)
Underlying technology	Near Field Communication (Sun, Zhang, Liao & Chang, 2021)	Quick Response Code (Nur Fathin, Roslina, Yazriwati, Norziha, Suraya & Rasimah, 2020)
Action required to pay	Bring the NFC-enabled mobile device closer to payment terminal or tap the NFC-enabled mobile device on payment terminal (Ng, 2019).	Launch the mobile payment application and scan the QR code displayed at the payment checkout point (Ngo & Nguyen, 2021)
Level of security	Highly secure as it uses encryption to facilitate the payment process (Yang, 2020)	Less secure as it can be easily attacked and subject to Malware and Trojans. It is also subject to phishing and spoofing. (Zhong, 2020, Manjula, 2019; Ohigashi, Kawaguchi, Kobayashi, Kimura, Suzuki, Okabe & Izu, 2021)
Transaction speed	Almost instant when the consumers tap or bring the NFC-enabled mobile device to the payment terminal (Kuyucu, 2019)	Immediately after the consumers scan the QR code. The time involved in scanning depends on the user and may vary from one to another due to factors such as users' level of expertise in scanning the code, lighting effect of the surrounding, and clarity of the QR Code (Kuyucu, 2019; Nofal, 2020; Edinger, Bar-Shalom, Sandler, Rantanen & Genina, 2018)

Table 1-1. Continued

Attributes	NFC based Mobile Payment	QR Code based Mobile Payment
User friendliness	Very user friendly as it requires minimum effort from the users to make payment (Kuyucu, 2019)	User friendly but may not be friendly for non-tech savvy consumers as it requires scanning action from the user side to make payment. (Kuyucu, 2019)
Pre-requisites	Mobile device that supports NFC function (Sun, Zhang, Liao & Chang, 2021)	Mobile device that allows QR code scanning. (Nur Fathin, Roslina, Yazriwati, Norziha, Suraya & Rasimah, 2020)

1.3 Problem Statement

Moving towards a cashless society by leveraging mobile payment has become an important agenda for many countries across the globe, including Malaysia (Abdullah et al., 2020). Malaysia is trying its best to achieve this transformation by engaging in various initiatives; unfortunately, the outcome is not as fruitful as expected. The mobile payment adoption rate in Malaysia is relatively lower compared to other countries (Aji, Berakon & Husin, 2020). According to the latest statistics on mobile payment in the year 2020, the percentage of mobile payment usage in Malaysia was 40% (New Straits Times, 2021a). Though this percentage looks promising, it is important to note that it was only achieved after the Covid-19 pandemic, which forced Malaysian consumers to engage in mobile payment as a result of government rules to prevent the spread of the deadly virus in the community. To compare, the percentage of mobile payment usage in Malaysia prior to the pandemic was 34% in 2019 and 23% in 2018 (Ariffin & Lim 2020; PwC, 2019). Thus, the 40% figure did not happen due to the voluntary increase in the use of

mobile payment; instead, it happened involuntarily due the pandemic's circumstances (Aji et al., 2020). Moreover, the difference in the percentage of mobile payment usage from 2018 to 2020 is not that significant even with the presence of these external factors that pushed its usage. In fact, the growth in percentage in 2020 (6%) was relatively lower than the growth in year 2019 (11%).

Malaysia started its journey towards a cashless society quite some time ago by leveraging cashless methods such as bank cards and online payment. The mobile payment is Malaysia's latest instrument to achieve the cashless goal (Azmana, Yia & Bakri, 2020). Even though there are many cashless payment options, Malaysian consumers still opt for the use of physical monies to make payment. Undoubtedly, cash is still king in Malaysia (Loh, Lee, Tan, Ooi, & Dwivedi, 2020). Currently, 92.5% of transactions in the country are concluded using cash (Karim, Yusoff, Ismail, Mazlan, Ghani & Muhammad, 2021). According to Bank Negara Malaysia, there is RM130.4 billion worth of cash in circulation in the Malaysian economy, despite the pandemic that forced Malaysian consumers to use cashless payment options. In fact, this cash figure is the highest in the last 10 years. It is alarming to know that the volume of cash-based transactions in Malaysia is still high in spite of various efforts taken to promote cashless transactions.

Mobiles phones have helped many countries achieve their cashless society agenda. Sadly, Malaysia is yet to utilise this innovative technology for its cashless goal (Aji et al., 2020). According to Bamansoor, Saany and El-Ebiary (2020) and Atan, Zahari and Lee (2020), mobile phones (especially smart mobile devices) have become an important part of Malaysian consumers' lives, given that 89.4% of the total population owns a mobile phone (Nasser, Loh, Rashid, Sharifat, Ahmad, Ibrahim & Suppiah, 2020). The mobile phone penetration rate in Malaysia is 140%,

indicating that most Malaysians own more than one mobile phone (Ooi & Nazar, 2021; Lee, Wong & Lee, 2020). The high mobile penetration rate has given industries in Malaysia the opportunity to come up with various mobile-based services, such as mobile banking (Wasiul, Arije & Huda, 2020), mobile shopping (Lim, Yeo & Wong, 2020), mobile health (Khan, Qureshi, Mustapha, Irum & Arshad, 2020) and more (Fadhil et al., 2019; Balakrishnan & Shuib, 2021; Hee, Ying, Kowang & Ping, 2020; See & Goh, 2020).

Correspondingly, the payment industry in Malaysia also took advantage of the high mobile penetration rate to offer mobile payment services. Unfortunately, the service has not been well-received by Malaysian consumers (Balakrishnan & Shuib, 2021). A recent survey by VISA, the leading global payment solution provider, indicated that 70% of Malaysians are ready to use mobile payments for their daily expenses (Tan, Memon, Sim, Leong, Soetrisno & Hussain, 2019). Though Malaysians show a high acceptance rate, in reality, the actual number of mobile payment users and the actual number of payments made using mobile payments are relatively low. Statistics from Bank Negara reveal that only 8% of Malaysians actively use mobile payments (Lui, Zainuldin, Yii, Lau & Go, 2021).

When it comes to making payments using mobile phones, Malaysians have two options. The first is the NFC-enabled mobile payment while the second is the QR-based mobile payment. Astonishingly, Malaysian consumers who have adopted mobile payment have predominantly opted for the QR-based payment option over the NFC one, despite the latter's benefits over former (Yan et al., 2021). According to See and Goh (2020), one of the major reasons for Malaysians' slow adoption of mobile payment is their inherit distrust of it, which has hampered the progress towards a cashless society. Malaysians are worried about the safety and privacy of

the financial information they must share during the payment process (Roseli, Azhar, Sauid, Hasan & Othman, 2021).

On the other hand, according to Hajazi et al. (2021), Malaysian consumers lack information about mobile payment, especially related to its benefits, functions, and usefulness; this is another major barrier towards its adoption. The adoption of mobile payment over traditional cash payment would benefit consumers in many ways, which they are not aware of. This lack of awareness makes mobile payment appear no better than their existing payment method. Moreover, Malaysian consumers' habit is also said to be a major deterrent factor towards the adoption of mobile payment. Cash has been used by Malaysians as their primary payment method for a very long time; hence, they view it to be compatible with their lifestyle and value it due to their long-term usage (Lau, Lee, Lew, Loo, Ooi, Lee & Tan, 2021).

Last but not least, the low acceptance of mobile payment among members of the payment ecosystem is another stumbling block to the adoption of this payment method. According to May, Hartini and Yee (2021), mobile payment is still not widely accepted by many merchants, making it hard for Malaysians to transact freely with it in the commerce ecosystem. This barrier is said to hinder Malaysian consumers' adoption intention towards the mobile payment method (May, Hartini & Yee, 2021).

Identifying and addressing the factors that lead Malaysian consumers to adopt mobile payment would help Malaysia speed up the adoption rate of this innovative payment method (See & Goh, 2020). It is crucial to encourage Malaysian consumers to adopt this payment method, since a high reliance on cash may lower the GDP of

developing economies such as Malaysia (Ishak, 2020). Indeed, the GDP of Malaysia in 2020 shrunk by 5.6%, which was 1.1% more than expected (Rudan, 2021; The Strait Times, 2021). Malaysia was determined to rebound its GDP growth by 6% to 7.5% in 2021 (Ministry of Finance Malaysia, 2021). However, the actual GDP growth in 2021 was only 3.1% (Bank Negara Malaysia, 2022). The Malaysian government also aspires to regain its Asian Tiger status by 2030 (Schaper, 2020; New Straits Times, 2019). In order to be the Asian Tiger, a country should have a significant growth rate (Abidin, 2020). Studies have showed that shifting from a paper-based payment system to an electronic payment system can improve the GDP growth of a country (Ishak, 2020). Hence, the shift to a cashless society by leveraging mobile payment will not only improve the GDP of Malaysia, but will also bring Malaysia one step closer to its goal of becoming the Asian Tiger again.

In Malaysia, the portion of tax revenue in the government's total revenue is relatively high. Malaysia uses its tax revenue for government development and infrastructure projects. The collection of tax is thus essential for the continuous growth of Malaysia's economy as well as for the well-being of Malaysian citizens. Sadly, the tax evasion rate in Malaysia is high. The latest statistics by the Inland Revenue Board of Malaysia revealed that the tax collection rate in Malaysia is only about 50% to 55% (Hassan, Palil, Ramli & Maelah, 2021). According to Ali, Harum, Abu, Talib, Doheir and Al-Mhiqani (2019), the shift to a cashless society would enable Malaysia to reduce the tax evasion rate and subsequently increase its revenue through tax collections.

Generally, countries from the Asian region are said to have low financial inclusion (Vo, Nguyen & Van, 2021). However, Malaysia must be praised for its excellence in this matter. The latest statistics on financial inclusion indicate that 85%

of Malaysians own a bank account, which is relatively higher than other countries such as India (80%) and Indonesia (48%) (New Straits Times, 2021b). Though Malaysia is witnessing a high financial inclusion rate, it is important to take note that there are still 15% of Malaysians who are financially excluded. According to Ahmad and Rahman (2021), the shift to a cashless society via mobile payment would lead to greater financial inclusion and subsequently, better financial sustainability as well as more effective monetary policy. As such, it is crucial to switch to a cashless society by leveraging mobile payment for Malaysia to be able to provide financial inclusion to its excluded population. Inclusion would allow the remaining population to gain access to a range of financial products and services that they could not access before. Overall, financial inclusion plays a crucial role in developing the economy of the country and ensuring the stability of its financial system (Kumar, Thrikawala & Acharya, 2021).

On the other hand, corruption is an issue in Malaysia which can be addressed through the switch to a cashless society (Ahmad, Arifuzzaman, Al Mamun & Oalid, 2021). The corruption rate in Malaysia in recent days are alarming. The 2020 Corruption Perceptions Index (CPI) ranked Malaysia in 57th position (The Star, 2021), which was worse than the previous year's ranking at 51th position (Low, Clive, Tan & Vinitha, 2020). According to Muhamad and Gani (2020), corruption is a serious issue for a country, as it has the ability to impede national growth. In Malaysia, corruption does not only impede growth, but also burdens citizens by increasing their cost of living (Aziz, Wen, Azman & Sufian, 2020). A number of researchers have established that going cashless by leveraging mobile payment can curb corruption in a country (Aziz, Wen, Azman & Sufian, 2020; Pushparaj, 2021; Abidin, Suryanto & Utami, 2020; Aliyu, Arasanmi & Ekundayo, 2020; Ishak, 2020;

Ahmad, Arifuzzaman, Al Mamun & Oalid, 2021). As such, Malaysia can benefit by taking advantage of this innovative payment method to become a cashless society and thereby lower its corruption level. The cashless method leaves a trail for the relevant authorities to trace and track any suspicious transactions, which is not possible when cash is used. Thus, it would be difficult for people who wish to engage in corruption, as everything is automatically disclosed to the relevant authorities when a payment transaction is made. In other words, cashless payments make payment processes transparent and traceable, subsequently combating bribery and corruption (Handa, 2020).

Crimes, especially theft and robbery, are another major issue in Malaysia. According to the latest statistics released by Department of Statistics Malaysia, the number of property crimes in Malaysia is 66,967. Theft and robbery are the major contributors of property crimes in Malaysia (Hasni, 2021). According to Ishak (2020) and Ali, Harum, Abu, Talib, Doheir and Al-Mhiqani (2019), the shift to a cashless society can reduce crime rates associated with theft and robbery. Under cashless payment methods, such as mobile payment, there would not be any cash for robbers to steal as no physical monies are involved in this payment method (Moghavvemi, Mei, Phoong & Phoong, 2021). If robbers steal the mobile phone itself, they cannot access it if it is locked with security passwords or other security measures (Ahmed et al., 2021). Moreover, mobile phones' location can be easily tracked using various methods (Kanimozhi & Padmapriya, 2021). Even if robbers manage to break the security lock and access the mobile phone's contents, they cannot use the money from the e-wallet as the e-wallet can be easily blocked by the owner with just an immediate phone call after any unforeseen circumstances. In the case of unblocked e-wallets, thieves still cannot use it as the e-wallet requires the user to key in a pin,

password, or biometrics to make the payment (Naidu & Seshadri, 2020; Wang et al., 2020). Hence, the migration towards a cashless society via mobile payment can help Malaysia reduce crime rates related to theft and robberies.

Last but not least, the switch to a cashless society by leveraging mobile payment would help Malaysia control the spread of Covid-19 and other infectious diseases. According to Hussain (2020), physical monies facilitate the spread Covid-19, which can stay on banknotes for up to a few days. In some countries, physical monies were quarantined for seven to 14 days under heat and ultraviolet light and were then sanitised before being released into the economy to circulate. This made consumers across the globe fear cash and shift to cashless methods (Daqar, Constantinovits, Arqawi & Daragmeh, 2021). Unfortunately, Malaysians appear to be reluctant in this matter. They still rely on physical monies, which is why cash was and is still widely used even during the pandemic (Ooi & Nazar, 2021). The number of Covid-19 cases in Malaysia were worrying at the time, with growing a death toll (Wong & Alias, 2021). Physical monies could have been silent carriers of the Covid-19 virus that spread the disease among Malaysians. Therefore, it is wise for Malaysians to shift to mobile payment from physical monies as this will not only save Malaysian citizens from disease outbreaks in the future, but also equip them with the various benefits associated with this innovative payment method (Aji et al., 2020).

Though the switch to a cashless society through mobile payment would help Malaysians tackle various issues present in the economy, they are still hesitant to adopt it (Hee, Ying, Kowang & Ping, 2020). Malaysians are sceptical about the safety features of mobile payment (Aziz, Wen, Azman & Sufian, 2020; Hee et al., 2020). Generally, mobile payments are safe to use (Kuo, 2020); the NFC-enabled

mobile payment, in particular, is far more secure than the QR-based mobile payment (Reiting, Mladenow, Strauss & Kotsis, 2020). In the NFC-enabled mobile payment, all data transferred during the payment process are encrypted and can only be decrypted using the special key of the authorised party (Kulkarni, 2021; Thammarat, 2020; Ahmed et al., 2021).

Ultimately, the usage of the NFC-enabled mobile payment can benefit not only individuals but the nation as a whole. However, it is surprising that research on NFC-enabled mobile payment adoption remains neglected in Malaysia, despite its low adoption level compared to QR-based mobile payment. In fact, the number of studies conducted on mobile payment in Malaysia is relatively low, regardless of the type of mobile payment being studied (Andrew & Tan, 2020). It is thus vital to identify and address the factors that lead to the successful adoption of NFC-enabled mobile payment among Malaysian consumers from various perspectives. This valuable insight will be useful for Malaysia in ensuring the smooth transition towards a cashless society by leveraging this innovative mobile payment method.

It was the Malaysian government's initial target to go cashless by the year 2020; however, the transition process was not as rapid as planned (Lau, Lee, Lew, Loo & Ooi, 2018). As such, the government has revamped its plan and decided to give more time for the country to become a cashless society by 2050 (Azmana, Yia & Bakri, 2020). Nevertheless, the government has set the target to convert all government ministries and agencies to the cashless system by 2022 under the Malaysia Digital Economy Blueprint (Malaysia Digital Economy Blueprint, 2021). Hence, it is crucial to conduct as many studies as possible in this area to obtain valuable findings that support Malaysia's aim of moving towards a cashless society

through mobile payment, specifically from the perspective of NFC-enabled mobile payment.

1.4 Research Objectives

The following are the objectives intended to be fulfilled at the end of this research.

i) To identify whether there is a relationship between the independent variables (Perceived Relative Advantage, Perceived Compatibility, Perceived Complexity, Perceived Structural Assurance, Perceived Network Externalities and Perceived Technology Awareness) and the mediating variable (Perceived Value) of the study.

ii) To identify whether the mediating variable (Perceived Value) mediates the relationship between the independent variables (Perceived Relative Advantage, Perceived Compatibility, Perceived Complexity, Perceived Structural Assurance, Perceived Network Externalities and Perceived Technology Awareness) and the dependent variable (Intention to Adopt) of the study.

iii) To identify whether the moderating variable (Perceived Switching Cost) moderates the relationship between the mediating variable (Perceived Value) and the dependent variable (Intention to Adopt) of the study.

1.5 Research Questions

In order to facilitate this study's achievement of its objectives, the following research questions were developed.

i) Does a direct relationship exist between the independent variables (Perceived Relative Advantage, Perceived Compatibility, Perceived Complexity, Perceived Structural Assurance, Perceived Network Externalities and Perceived Technology Awareness) and the mediating variable (Perceived Value) of the study?

ii) Does the mediating variable (Perceived Value) mediate the relationship between the independent variables (Perceived Relative Advantage, Perceived Compatibility, Perceived Complexity, Perceived Structural Assurance, Perceived Network Externalities and Perceived Technology Awareness) and the dependent variable (Intention to Adopt) of the study?

iii) Does Perceived Switching Cost moderate the relationship between the mediating variable (Perceived Value) and the dependent variable (Intention to Adopt) of the study?

1.6 The Scope of the Study

This study was carried out with the aim of investigating the factors that influence Malaysian consumers' intention to adopt NFC-enabled mobile payment for the cashless society goal. To achieve this aim, this study used an extended Diffusion of Innovation (DOI) model made up of the attributes of innovation and other significant variables perceived to have the ability to predict the adoption intention of NFC-enable payment in the Malaysian context. A few other theories were also

employed concurrently, namely the Institutional-based Trust Theory, Network Externalities Theory, Value-based Adoption Model (VAM), Status Quo Bias Theory and the Stimulus-Organism-Response (S-O-R) theory. In this study, the cross-sectional quantitative research approach was employed to study the direct and indirect relationships among the variables of the study. The self-administrated online survey questionnaire was used as the research tool to gather data from the target respondents. The unit of analysis of this study was Malaysian consumers (i.e., Malaysian citizens) aged 18 and above who own a smart mobile device as well as a credit or debit card. Existing NFC-enabled mobile payment users were omitted from the context of this study since the focus of this study was on adoption intention rather than continuance intention. Finally, the gathered data was analysed using the partial least squares structural equation modelling (PLS-SEM) technique.

1.7 Significance of the Study

1.7.1 Theoretical Significance

This study contributes several theoretical significances. First, the number of studies conducted in Malaysia on the adoption intention of mobile payment is very limited, especially pertaining to the adoption intention of NFC-enabled mobile payment. As such, this study contributes novel and valuable insights to the existing body of knowledge on the factors that lead to successful NFC-enabled mobile payment adoption in the Malaysian context.

Second, to the best of the researcher's knowledge, this is the first study in Malaysia to address the adoption intention of NFC-enabled mobile payment from the indirect mediating perspective of perceived value. It also contributes valuable insights about the adoption intention of NFC-enabled mobile payment from the

perspective of the moderating variable called Perceived Switching Cost. This appears to be the very first study in Malaysia to use both mediating and moderating variables to address the adoption intention of NFC-enabled mobile payment. Therefore, the outcomes of this study undoubtedly add meaningful new information to the existing NFC-enabled mobile payment literature from different perspectives.

Third, this study combines six theories, namely the DOI theory, Institutional-based Trust Theory, Network Externalities Theory, VAM, Status Quo Bias Theory, and S-O-R theory, to study the adoption intention of NFC-enabled mobile payment. This enables the study to test the effectiveness of these theories in predicting the adoption intention of this innovative payment method, which contributes new knowledge on the application of the theories.

Fourth, this study offers an extended DOI model to the academic literature. The original DOI model is made up of five attributes of innovation, namely Relative Advantage, Compatibility, Complexity, Trialability and Observability, which are used to predict the diffusion of a new innovation. However, Trialability and Observability are often regarded as not useful and insignificant in predicting the adoption intention of new innovations (Ooi & Tan, 2016). As such, the existing DOI model is extended in this study by dropping these two traditional variables and adding three new variables, i.e., Perceived Structural Assurance, Perceived Network Externalities and Perceived Technology Awareness, which are perceived to be significant. This extension allows this study to provide a more meaningful prediction on the adoption intention of NFC-enabled mobile payment among consumers in Malaysia.

Apart from that, the samples and data analysis techniques used in this study further contribute new knowledge as they are novel in their own way. By closing the gaps in the existing literature on the adoption intention of NFC-enabled mobile payment, this study serves as a guide and reference point for similar aspiring research in the future. The novelty instilled in every aspect of the research undoubtedly contributes to valuable new findings.

1.7.2 Practical Significance

This study also provides several contributions in terms of practical significance. First, becoming a cashless society by leveraging mobile payment is an important agenda for Malaysia. The government, together with various parties like banking institutions, telecommunication companies, mobile wallet service providers, and vendors, are continuously engaged in planning and implementing various initiatives that stimulate the adoption of this mobile payment methods. Nevertheless, the outcome has not been as fruitful as expected.

As such, the findings of this study, especially on the significant factors in the adoption of NFC-enabled mobile payment, would be beneficial to parties involved in the ecosystem of this innovative payment method. For example, managers and policymakers can plan and allocate their resources to the right factors. The information on significant factors would also help industry players focus on the correct attributes to spur the adoption of mobile payment. With this contribution, the planning and implementation of initiatives to boost NFC-enabled mobile payment can be done more efficiently without wasting resources, be it money or effort, on the wrong attributes.

Next, the outcomes of this study are beneficial to relevant parties in gaining a rough idea of Malaysian consumers' intention to go cashless by opting for this particular variant of mobile payment over the available alternative. This information is crucial for industry players to formulate plans and strategies related to necessary infrastructures to support the use of this payment method at various locations. Merchants can also utilise this information to prepare themselves to offer this payment option to consumers. The setting up of a facility that supports this innovative payment method will incur the outflow of resources, such money and effort, as part of the implementation process. As such, knowing the potential usage rate will enable interested merchants to make more informed decisions about incorporating this payment method in their business ecosystem.

Besides, the findings of this study are highly useful for mobile phone manufacturers to integrate the relevant software and hardware in their upcoming models based on consumers' demand for mobile payment methods. In order to make NFC-based mobile payment, a mobile phone should support the NFC function. Mobile phone manufactures can thus use the findings of this study to plan the production of mobiles phones with the NFC function so that the market demand matches their supply. This would help mobile phone manufacturers enhance their profits and eliminate the risk of loss due to producing or delivering unfavourable products. In a nutshell, this study provides ideas to practitioners and policymakers on factors and features they should focus on to stimulate Malaysian consumers to utilise the NFC-enabled mobile payment method to become a cashless society.