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PREDICTING QR-CODE M-PAYMENT CONTINUANCE INTENTION THROUGH GAMIFICATION IN MALAYSIA: THE MODERATING ROLES OF MINDFULNESS

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CONFIRMATION BY PANEL OF EXAMINERS

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ABSTRACT

The Covid-19 pandemic accelerated Malaysia's transition toward a cashless society and increased the adoption of mobile payment (M-payment) systems. Despite the widespread use of QR code-based M-payments during the Movement Control Order (MCO), post-pandemic consumer behaviour indicates limited perceived enjoyment and continued reliance on cash. Limited research has examined how gamification elements influence continuance intention toward QR code-based M-payments in Malaysia's post-pandemic business environment. Underpinned by Flow Theory and employing the Octalysis Gamification Framework, this study investigates the effects of gamification elements on continuance intention through the mediating roles of attitude and perceived enjoyment, and the moderating role of mindfulness. The study focuses on users of QR code-based M-payment in the Central Klang Valley. A minimum sample size of 184 was determined using G*Power, and data were collected from 426 respondents through purposive non-probability sampling. The data were analysed using SPSS and SmartPLS. The findings reveal that meaning and social influence positively affect attitude, while meaning, development, and social influence significantly influence perceived enjoyment. Both mediators significantly affect continuance intention. Mediation analysis identified five significant indirect effects, confirming the mediating roles of attitude and perceived enjoyment. Moderation analysis provided partial support for the proposed relationships. Specifically, the interaction between ownership and mindfulness was significant in the predicted direction, whereas the interaction involving social influence was significant but contrary to the hypothesised direction. The remaining moderating relationships were not supported. The study concludes with theoretical and practical implications for M-payment adoption, along with its limitations and recommendations for future research.

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LIST OF SYMBOLS

Symbols

α	Cronbach Alpha
r	Coefficient of Correlation

LIST OF ABBREVIATIONS

Abbreviations

DOI	Diffusion of Innovation
IDT	Innovation Diffusion Theory
M-payment	Mobile Payment
NFC	Near Field Communication
QR	Quick Response
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
TRA	Theory Reasoned Action
UTAUT	Unified Theory of Acceptance and Use of Technology

CHAPTER 1
INTRODUCTION

1.1 Research Background

This dynamic world requires intellectual generation and technology to progress forward concurrently. The technology revolution is leading humanity; it has significant impacts and can be considered as an inevitable power. The current century demonstrates an increasingly interesting way that technology influences business, environment, and human behaviour (Alshurideh et al., 2021). Building on this, the role of the Internet has become central in shaping technological advancements. As of 2025, technology is more deeply woven into everyday life than ever. With near-ubiquitous Internet connectivity and advanced mobile infrastructures, Malaysia has witnessed rapid change. Recent reports indicate that Malaysians now lead the world in mobile wallet usage with 63% of the population using mobile wallets for transactions (Adyen, 2024).

While these statistics demonstrate the widespread use of mobile wallets, the reported usage refers primarily to the proportion of consumers who conduct transactions using mobile wallets rather than the frequency or value of transactions. More importantly, high usage rates do not necessarily indicate sustained continuance intention, particularly when consumers have alternative payment options available. Additionally, the innovation of mobile technologies and payment methods has transformed traditional payment methods into digital approaches. This transformation continues, driven by economic developments, social networks, and smartphone penetration. Since smartphones are now indispensable, consumers gain advantages from flexible and convenient payment methods when purchasing goods or services through this new channel. Mobile payment systems have adapted not only to a mostly digital and mobile-driven reality but also to a business climate that demands transactions anywhere, anytime, and for anyone (de Luna et al., 2019).

Different types of mobile wallets perform payment transactions differently. Some build connections between customers and merchants through QR code scanning, while others are limited to Internet transactions. Near Field Communication (NFC) technology is also employed for payment transfers, although it is not supported by several smartphones. Mobile wallets (m-wallets) consist of activities conducted

exclusively using a mobile phone instead of a laptop, tablet, or other devices. One of the major activities is mobile payment (M-payment). M-payment refers to a process of funds transfer to obtain goods or services, in which a mobile wallet is used to initiate and confirm the payment via a mobile phone (Moorthy et al., 2020).

Loh et al. (2021) defined mobile payment as the use of mobile wallets as devices to complete transactions for goods or services or to pay bills. Mobile payment can be categorized into two types: proximity and remote. As supported by Slade et al. (2014), proximity M-payment involves close interaction between users and merchants, while remote M-payment involves transactions that do not require direct interaction between consumers' mobile phones and merchants' points of sale.

A survey conducted among Malaysians regarding the cashless society revealed that numerous advantages can be derived from using digital payment. Notably, the risks of scams can be reduced, the spread of viruses can be minimized, and financial histories can be effortlessly traced (Tariq, 2022). In terms of cashless innovation, the most favoured by Malaysians were self-service checkout (64%) and automated app payment (64%), followed by biometric payment such as facial or fingerprint scanning (60%). Cashless transactions were mostly used for paying bills, food or dining, and purchases at supermarkets, retail, or convenience stores (Tariq, 2022). However, compared to digital remittance, digital commerce and mobile point-of-sale payments remain relatively low in terms of average transaction value per user (Statista, 2023).

Mobile payment, conducted electronically via smartphones, plays a crucial role in modern electronic commerce (e-commerce). This is why many scholars and information system designers focus on this matter. This payment method has been defined differently across fields, from accounting and finance to business technology and information systems (Kabir et al., 2015). From a marketing perspective, electronic payment is defined as any type of payment without using cash, excluding even paper cheques. In current research, mobile payment studies are divided into several popular topics. As noted by Leong et al. (2020), these studies can be classified into acceptance or intention to use, rejection, inhibitors, adoption of mobile wallets, intention to switch, requirements for the mobile wallet ecosystem, and satisfaction with mobile payment. Although prior studies have extensively examined the adoption and acceptance of mobile payment technologies, less attention has been given to users' continuance intention, particularly in the context of QR code-based mobile payments. Understanding continuance intention is important because long-term success depends not only on

initial adoption but also on users' willingness to continue using the technology after the novelty effect and external pressures have diminished.

According to Oh (2018), consumer adoption of payment systems is crucial for providers, and acceptance by merchants significantly increases the likelihood of success, especially when adoption occurs at a massive scale. Mobile payment usage is highly encouraged as cashless society initiatives can help boost a country's economy by up to 1% in savings due to reduced retail payment costs and lower reliance on cash transactions. To support adoption, Bank Negara Malaysia (BNM) launched the Interoperable Credit Transfer Framework (ICTF) on 1st July 2018. This initiative ensures that both banks and non-banks have unbiased and non-restrictive access to payment infrastructure (Oh, 2018).

Data from DataReportal (2026) reported that Malaysia's cellular mobile connections reached 122% of the population, providing a robust digital foundation for mobile payment adoption. Concurrently, the Bank Negara Malaysia (2025) acknowledged the compounding advantages of digital transactions, intensifying its regulatory and infrastructural efforts to accelerate national e-payment adoption under its Financial Sector Blueprint. For example, in 2020, the Malaysian government initiated incentive programmes by providing RM30 (e-Tunai Rakyat) and RM50 (e-Penjana) to promote mobile payment usage (Ong, 2020). The outcomes showed that digital wallet usage rose to 62% during the first quarter of 2020 under e-Tunai Rakyat, declined to 49% in the second quarter, and increased again to 60% in the third quarter under e-Penjana (Oppotus, 2022). Although fluctuations were observed, digital wallet usage never dropped below 50% in later years, and by the third quarter of 2022, usage remained at 55%. In terms of average usage, the number of digital wallet brands per user decreased from three to four brands to only three brands in Malaysia (Oppotus, 2022).

Apparently, mobile payment is one of the best outcomes of the integration of the Internet and technology. It has been accepted globally, including in Malaysia. PricewaterhouseCoopers (2021) estimated that global cashless transaction volumes will more than double between 2020 and 2030, with the Asia-Pacific region leading this shift through a projected 109% increase in digital volumes. More specifically within regional clusters, PricewaterhouseCoopers (2020) reported that Southeast Asia's e-wallet and mobile payment market segment surpassed USD 22 billion and is on track to grow fivefold, exceeding USD 114 billion**.** Favourable levels of mobile and Internet

penetration have led to an increase in the number of non-bank e-money providers, which rose by 33% from 2016 (64%) to June 2018 (86%). Furthermore, Malaysia's youthful and tech-savvy population (with more than 50% aged below 35 years) and high financial literacy (85% of the population is banked) further support adoption.

In addition, the outbreak of COVID-19 began in Wuhan City, Hubei Province, China, with cases of pneumonia of unknown cause being reported (Shah et al., 2020). The Chinese government informed the World Health Organization (WHO) of this virus at the end of December 2019 (Johnson, 2020). Malaysia recorded its first COVID-19 case on January 25, 2020, within less than 48 hours of the first case in neighbouring Singapore. Subsequently, the government implemented the Movement Control Order (MCO) on March 18, 2020, restricting people's movement in and out of designated zones (Shah et al., 2020; Ahmad Ramli et al., 2023). Consequently, Malaysians increasingly relied on online transactions and began showing positive reactions towards mobile payment adoption. However, the post-endemic phase presents a different situation. As movement restrictions were lifted and traditional payment methods became readily accessible again, consumers were no longer compelled to use mobile payments out of necessity. Consequently, understanding the factors that encourage continued usage of QR code-based mobile payments has become both a theoretical and practical concern.

According to Statista (2023), the COVID-19 pandemic accelerated the growth of the digital payment market due to increasing acceptance of mobile payments, the expansion of e-commerce, and the growing use of contactless transactions. Seamless and secure systems boosted the popularity of digital wallets and mobile payment applications such as Venmo, PayPal, and Cash App. The expansion of the digital payment market was also driven by the rise of fintech and the integration of blockchain technology into payment systems. Meanwhile, the pandemic reinforced the importance of safety and hygiene for both users and businesses. Furthermore, while previous studies have primarily focused on technological, utilitarian, and adoption-related factors, limited research has examined how gamification elements influence users' continuance intention toward mobile payments. Gamification has been widely applied to enhance engagement and enjoyment in digital environments, yet its role in sustaining post-adoption mobile payment behaviour remains insufficiently understood.

Supporting this view, Tan (2020) highlighted findings from the Mastercard Impact Study, which revealed that Malaysia had the highest percentage of mobile wallet

usage in Southeast Asia after the outbreak. Mobile wallet usage reached 40% in Malaysia, followed by the Philippines at 36%, Thailand at 27%, and Singapore at 26%. Later, Mobile wallet usage in Malaysia has surged dramatically, reaching 87% penetration of the consumer population, according to the latest (Visa, 2025) This finding demonstrates that, despite favourable reactions towards mobile payment adoption, some Malaysians still resist its use. Thus, while electronic payment adoption has increased significantly, it has yet to achieve universal acceptance in Malaysia. This situation suggests that adoption alone is insufficient to ensure long-term usage. Despite the increasing prevalence of QR code-based mobile payments in Malaysia, questions remain regarding why some users continue using these services while others discontinue or reduce their usage. Therefore, further investigation is needed to understand how gamification-driven experiences, attitudes, and perceived enjoyment contribute to continuance intention in the post-endemic environment.

1.2 Problem Statement

Malaysians' attitude towards cash is still lingering as according to Financial Information System (FIS) in 2020, Malaysia strongly leans on cash usage with 64% of transactions made in cash. However, Malaysian consumers believe the Covid-19 pandemic has accelerated the time taken for the country to become a cashless society. In the current circumstances, they believe a cashless society could be a possibility by 2025 (The Sun, 2022). If the pandemic had not happened, respondents believe a cashless Malaysia would not be possible until 2028 (The Sun, 2022).

However, a 100 percent cashless society is yet to be achieved due to the existence of consumers who might still resist using mobile payment, especially baby boomers. The age increase has an impact on the attitude towards innovation, especially in terms of technology, mostly in a negative way (Zhang, 2023). The majority of baby boomers were annoyed that they felt the innovation of technology is too quickly proliferated (Larsson, Larsson-Lund, & Nilsson, 2013). They are commonly regarded as individuals averse to change and who keep traditional values, which makes them hard to accept technologically advanced goods or services (Badowska, Zamosjska & Rogala, 2015). Unfortunately, baby boomers in Malaysia are the market segment that have high-income levels and career success but indicated only 16 percent of them made

transactions using mobile payment as compared to Generation X and Generation Y which indicated 40% and 49% respectively (Badowska et al., 2015).

This study recognizes issues or problems in the mobile payment domain from both theoretical and practical perspectives. Although mobile payment adoption has been widely studied, the issue of continuance intention remains less understood. Existing studies have largely focused on why consumers initially adopt mobile payment technologies, but limited attention has been given to why users continue or discontinue usage after adoption, particularly in the post-pandemic environment where consumers are no longer compelled to rely on digital payment methods. The practical perspective provides real-world relevance and user-oriented outcomes in the view of mobile payment. On the other hand, the theoretical perspective offers insights into underlying principles and has an impact on knowledge in a long-term period.

Thus, from a practical view, the prevalence of cash over mobile payments is mainly due to insufficient infrastructure support, resistance to change, and a lack of awareness among users. According to Lonare et al. (2018), previous studies on mobile payment have indicated there were obvious gaps in the research. They also added that there is a lack of attention to many government policies implemented to encourage digital payment and their effects. Malaysian government has implemented an RM30 subsidy to encourage digital payment where the e-wallets involved were Boost, GrabPay, and Touch n Go e-wallet. This incentive was useful for those who were already aware of digital payment. In contrast, Malaysians living in rural areas, who commonly have little knowledge regarding digital payment, ignored this kind of subsidy due to lack of awareness.

While these practical issues provide important explanations for the slower diffusion of mobile payment services, they do not fully explain why some existing users continue using mobile payment whereas others reduce or discontinue their usage despite having prior experience with the technology. Mobile payment resistance occurred due to many uncertain variables. Until now, these issues are not fully solved and are still a hindrance to full adoption. One of the issues involves the facilities that support mobile payment transactions which are considered as a very important tool to complete a sales process (Kar, 2020). To date, users still face difficulties with mobile payments as some stores, both in rural and urban areas, lack the necessary facilities or point-of-sale systems to accept mobile payments and only handle cash transactions. Complicated

payment procedures, low merchant acceptance, and user knowledge are several elements that drive individuals to refuse mobile payment (Kar, 2020).

Furthermore, for the data to be encrypted and accept responses, the Internet is needed. However, any transactions would be impossible with unideal Internet conditions or without a signal (Lin et al., 2020). To prevent these issues, a solution has been introduced by M-payment providers that employ an idea called 'tokenization'. Tokenization is a limited-use virtual card that would be saved in the user's mobile device to make purchases without having Internet access. Sad to say, tokenization brings its own security issues where it allows cybercriminals to take user's money without stealing the mobile device, thus, it also helps mobile payment resistance among people (Lin et al., 2020). This is crucial because Visa noticed that security remained a great concern for Malaysians in terms of mobile payment, supported by 89% of Malaysians valuing security more than convenience (Tan, 2020). Information security and privacy are crucial and should be recognized because information violation cases and issues are rising throughout the world including Malaysia (Ming et al., 2020). Lack of knowledge regarding information protection leads a privacy intruder an opportunity to invade someone's privacy such as identity theft, credit card fraud, and cybercrimes (Barrett-Maitland et al., 2016).

Another main issue from a practical perspective is the behavior and attitude of Malaysians toward the adoption of mobile payments after the emergence of Covid-19, indicating a deficiency in perceived enjoyment in the application. This issue is particularly important because the post-endemic phase differs substantially from the pandemic period. During the Movement Control Order (MCO), mobile payment usage was often driven by necessity, convenience, and health concerns. However, after restrictions were lifted, consumers regained the freedom to choose among multiple payment alternatives, making continuance intention a more relevant concern than initial adoption.

Due to the increasing number of e-payment systems, consumers are shifting from cash-based to cashless. Yet, converting to a non-cash economy is difficult, and existing cash-based trading practices are still firmly compacted (Yaokumah et al., 2017). Malaysia consists of a small market with many e-wallet players combating for market share and still in its early stage. As compared to other big countries, Malaysia's current population has not even exceeded 50 million. However, Malaysian consumers are already provided with many choices of mobile payment. Mobile payment users in

Malaysia are overindulged with choices, with over 50 e-money providers in the market. These issuers offer numerous discounts, incentives, and cashback promotions. Although BNM has established several measures to stimulate mobile payment usage, the main obstacle for electronic payment to develop is still the cash that is intuitive and remains to be seen among Malaysians (Hsian, 2019).

Oppotus (2022) indicated there was a 17 percent drop in digital wallet usage when Malaysia entered the third quarter of 2022. As compared to the second quarter of 2022, the usage was reported to decrease to RM244.59 per month, which demonstrated minus six percent. Oppotus (2022) added, Malaysians are using different types of payment methods and cash is still at the top in the ranking, followed by digital wallets even though QR-code-based payment can also be used physically. Since various payment methods were introduced, it has affected digital wallet usage where the frequency of Malaysians adopting the app is reduced. This is because Malaysians have returned to their normal activities. During the Covid-19 pandemic, online shopping became popular as it was more convenient, less time-consuming, and safe especially from a health perspective. Ordering food online was also people's choice at that point in time since they were not allowed to step out due to movement control restrictions. However, after the MCO was lifted by the Malaysian government, citizens were permitted to return to their normal daily activities (Yong & Sia, 2023). People began to shop physically as they still preferred to see, experience, and try the product in person. Not only that, they were ready for food hunting again to experience various types of food that were not in their food delivery radar and to feed their hobbies. Consequently, online purchases and food delivery reported a dip (Oppotus, 2022).

These circumstances portray Malaysians want fun, enjoyment, and excitement in their activities including their purchases. Therefore, making mobile payment an enjoyable payment method is a need. Consequently, service providers are increasingly seeking ways to create engaging and enjoyable payment experiences that encourage repeated usage rather than relying solely on functional benefits. One approach that has gained attention is gamification, which incorporates game-like elements into non-game environments to enhance user engagement and motivation. Besides, users are offered two types of M-payment, non-bank and bank based. Both types own different characteristics, benefits, and approaches that might affect user preferences even though their main aim is to facilitate mobile payment. However, bank-based shows more

favorable results in terms of user adoption and churn rates compared to non-bank M-payment.

There are some reasons that may contribute to the lower adoption and higher churn rates for non-bank M-payment. Non-bank M-payment is perceived as less secure and trustworthy since it is not linked with bank accounts or any traditional bank services. Users need to reload their money to use the mobile wallet which leads to a smaller customer base and lower merchant adoption. In contrast, bank-based payment suffered more in terms of regulatory restrictions which placed them in more difficult situations to expand their businesses (Vaddepalli, 2023). These issues give non-bank providers disadvantages especially in gaining and keeping users. Plus, non-bank M-payment relies more on gamification and other incentives which may be effective in the short term but cause high churn rates in the long term ((Andyani & Edy, 2025). For example, Malaysian mobile payment providers such as Touch 'n Go eWallet, Boost, and GrabPay have incorporated gamification features including reward points, cashback missions, referral campaigns, lucky draws, and achievement-based incentives to encourage repeated usage and customer engagement. Despite the increasing implementation of these gamified features, limited empirical evidence exists regarding their effectiveness in sustaining continuance intention among users.

While in terms of theoretical perspective, octalysis gamification rarely receives attention and is not a default choice of theories applied in the mobile payment domain. This is because mobile payment research has traditionally relied on technology adoption theories such as TAM, UTAUT, TPB, and IRT, which primarily explain rational decision-making processes. In contrast, the Octalysis Framework focuses on motivational and behavioural drivers that encourage engagement and sustained participation. Therefore, its application within the mobile payment context remains limited despite its potential relevance in explaining continuance behaviour.

Research on mobile payment fields has been conducted in recent years, meanwhile technology adoption has been investigated for a longer period. In a review of mobile payment studies, Dahlberg et al. (2015) concluded that the studies' main topics are adoption, strategy and ecosystem, and technology. In the marketing area, the majority of researchers have an interest in the factors that affect consumer acceptance of mobile payment. To elaborate in detail, numerous models and theories have been employed. The natural choices are the Unified Theory of Acceptance and Use of Technology (UTAUT), Technology Acceptance Model (TAM), Innovation Resistance

Theory (IRT), or Theory of Planned Behaviour (TPB) (Lai, 2017). Besides, the previous literature revealed that some researchers also use one theory to complement another (Flavian et al., 2020). These have been broadly employed to study technology acceptance, with outstanding and significant contributions. Nevertheless, these theories do not fully portray the rational aspects of technology acceptance because sometimes the user does not make this kind of decision depending only on realistic beliefs (Sun et al., 2016).

Most existing studies focus on adoption intention, acceptance, or initial usage behaviour. However, continuance intention represents a different behavioural stage because users have already experienced the technology and formed perceptions based on actual usage. Consequently, factors influencing continuance intention may differ from those influencing initial adoption, creating a need for further investigation. Gamification becomes particularly relevant in the post-adoption stage because continued usage often depends on maintaining user engagement, enjoyment, and motivation rather than merely facilitating initial acceptance. Therefore, examining gamification provides an alternative perspective for understanding sustained mobile payment usage behaviour.

As mentioned before, Malaysians prefer enjoyment in their daily activities, which makes the octalysis gamification framework applicable for this study as it contains game elements that are able to promote excitement. Gamification is considered new in the mobile payment context even though it has been popularly employed in non-gaming research areas. Due to its intrinsic nature for call to action, gamification is usually applied in many fields (Kim et al., 2016). Huotari and Hamari (2017) stated that gamification involves elements of persuasion and individual behavior and motivation. Before that, Thaler and Sunstein (2008) said that gamification is used to stimulate individuals to make decisions and prevent harmful biases.

Based on previous studies, gamification has been applied in several different domains which include electronic commerce (Aparicio et al., 2021), exercise (Hamari & Koivista, 2015), education and entertainment (Anselmsson et al., 2014), and health and fitness apps (Eisingerich et al., 2019). It is commonly used in health, commerce, politics, and public administration, especially education (Kim et al., 2016). Hence, there is little research to demonstrate the use of gamification in the mobile payment domain. In Malaysia, studies examining gamification within the mobile payment context remain limited, with most existing research focusing on adoption factors such as usefulness,

trust, security, and ease of use. Consequently, the role of gamification in promoting continued usage behaviour remains insufficiently understood.

In addition, another main issue from a theoretical perspective is the requirement for more research that involves mindfulness in the acceptance of mobile payments, particularly within specific contexts such as QR-code-based mobile payments. Certain researchers have agreed that psychological research should be properly introduced into IS studies (Raman & McClelland, 2019). Mindfulness is particularly relevant because users may respond differently to gamification elements depending on the extent to which they consciously process information, evaluate alternatives, and pay attention to their digital experiences. Consequently, mindfulness may influence the effectiveness of gamification in shaping continuance intention. In terms of technology adoption, some recent researchers such as Sun and Fang (2010) or Oredo and Njihia (2014) have regarded 'mindfulness' as a cognitive state of active attention. They selected technology (over its alternatives) because they believed and proposed that mindfulness is an important antecedent. It makes individuals more susceptible to any new information and aware of local conditions and alternative choices. The insertion of mindfulness as a concept will help to address the gaps observed in prior research.

Moreover, many countries have performed research on mobile payment and resulted in various findings. Flavian et al. (2020) employed the theory of mindfulness in their research on the factors that impact mobile payment adoption even though Sun et al. (2016) argued that it impacts technology acceptance. Nonetheless, both studies indicated mindfulness needs additional testing and repeated examination to obtain more validity. The concept of mobile payment is broad, encompassing various specific representations such as NFC, Internet, or QR-code-based mobile payment. Commonly, previous studies that use mindfulness in mobile payment were discussed in general concepts. The case of each mobile payment acceptance could be different and requires specific research (Flavian et al., 2020). This issue can be considered as a gap which will be examined further in this study. Mindfulness is rarely used in the mobile payment context as a moderator and there is little discussion on how it influences the relationship between gamification and mobile payment use intention.

Therefore, this research is conducted to find the answers to those problems, obtain findings, search for support from other studies or theories, and address the gaps appropriately, since a central contradiction emerges. Although mobile payment adoption and usage have increased considerably in Malaysia, cash remains dominant and many

users continue to alternate between payment methods. Existing adoption and acceptance studies explain why consumers begin using mobile payment services, yet they provide limited explanation regarding why users continue using them after adoption. Similarly, while gamification features are increasingly implemented in mobile payment applications, limited evidence exists regarding their effectiveness in sustaining continuance intention, particularly within QR-code-based mobile payment environments and under varying levels of mindfulness. Most importantly, this study will help the marketing society by providing information and knowledge on the relationship between gamification, mobile payment use intention, and mindfulness. The problems are summarized in Figure 1.1 below.

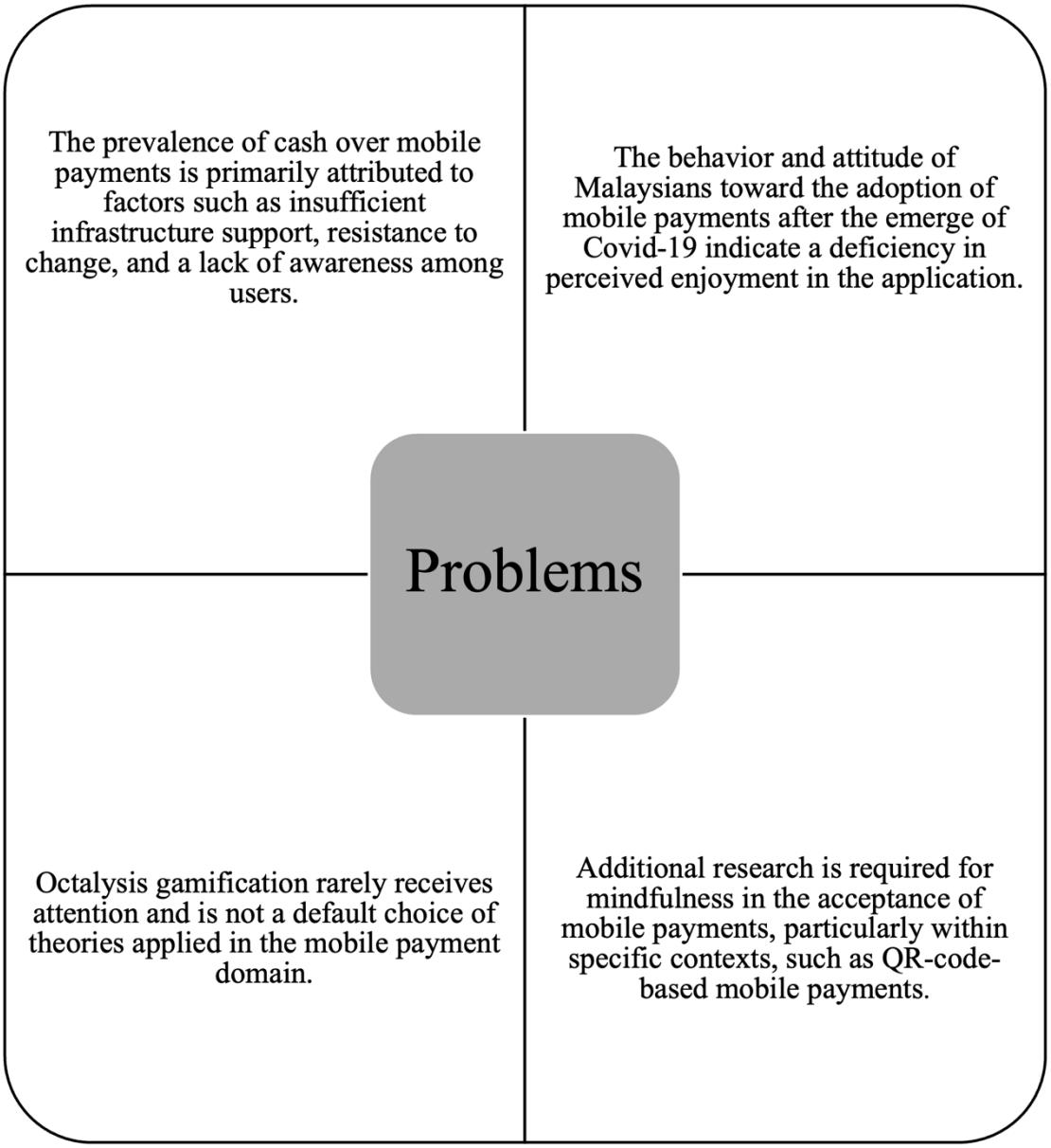

Figure 1.1 Summary of Identified Problems

1.3 Research Objectives and Research Questions

This research aims to study the information in wider aspect regarding the topic as outlined below:

1. To identify the impact of the octalysis gamification factors on users' attitude and perceived enjoyment, and how these factors subsequently affect continuance intention in mobile payment services in Malaysia.
2. To determine the mediating effect of attitude and perceived enjoyment among Malaysians in predicting continuance intention of QR-code-based mobile payments.
3. To assess the moderating effect of mindfulness in predicting continuance intention of QR-code-based mobile payments in Malaysia.

In order to achieve the objectives of the study, the questions below are being formulated:

1. Do octalysis gamification factors have impact on users' attitude and perceived enjoyment, which in turn affect their continuance intention towards mobile payment services in Malaysia?
2. Do attitude and perceived enjoyment have a mediating effect in predicting continuance intention of QR-code-based mobile payments?
3. Does mindfulness have a moderating effect in predicting continuance intention of QR-code-based mobile payments in Malaysia?

1.4 Significance of Study

The significance of study will be divided into practical implications and theoretical implications.

1.4.1 Practical Implication

This study is expected to assist mobile payment (M-payment) providers and users by offering essential knowledge on how mobile payment functions and the issues that arise within the Malaysian context. In general, Malaysia is still far behind in terms of complete adoption of mobile payments, and this gap requires further exploration, particularly from psychological and behavioural perspectives. After thorough research,

gamification has been selected as the core conceptual foundation of this study, with user attitude towards M-payment and perceived enjoyment acting as mediators, and mindfulness serving as the moderator. Specifically, this study focuses on QR-code-based mobile payment continuance intention in the post-endemic Malaysian context, rather than general fintech adoption. With the integration of gamification, providers are able to introduce game elements into the mobile payment domain to attract users, particularly when perceived enjoyment and user attitude are incorporated into the adoption process.

From a practical standpoint, this study is significant as providers may utilize its findings to address and control issues that continue to hinder full adoption of mobile payments in Malaysia. In addition, this study will contribute to creating awareness and educating providers as well as organizations about the importance of user attitude and mindfulness in the M-wallet industry. Finally, mindfulness is acknowledged as closely related to innovative behaviour. Its consideration is therefore highly relevant in this study, as it provides a psychological lens through which mobile payment adoption can be better understood. This study further explains how cognitive attention (mindfulness) may influence users' responses to gamified mobile payment systems, particularly in sustaining continuance intention rather than initial adoption. By incorporating this element, the research aims to offer meaningful insights for all involved parties in understanding the mobile payment ecosystem in Malaysia.

1.4.2 Theoretical Implication

There are a variety of research studies, concepts, models, and theories that are related to mobile payment. For instance, the Unified Theory of Acceptance and Use of Technology (UTAUT), UTAUT2, Innovation Resistance Theory (IRT), Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), and the Technology Acceptance Model (TAM). These frameworks have been widely employed to explain consumer behaviour, technology adoption, and resistance. However, there are limited studies that explain the significance of game elements in the mobile payment area. Thus, this study introduces gamification into this area, which is considered a non-gaming setting. In particular, this study integrates selected Octalysis gamification drivers to examine motivational mechanisms that extend beyond traditional rational adoption models. In addition, this study incorporates the mediating roles of users' attitude

towards mobile payment and perceived enjoyment in order to determine their significance within the mobile payment context.

Furthermore, this research identifies the role of mindfulness, which has already been proven to have an effect on technology adoption. The role of this construct is examined particularly in terms of its moderating effect on the relationship between gamification and mobile payment use intention. These relationships can be considered new in this domain and provide a novel contribution. Therefore, this study offers findings that contribute to previous literature by providing more evidence on the relationships between the variables of concern. It also makes a contribution through upgrading and improving the current conceptual framework, while offering additional support to concepts that have been discussed in previous studies. Moreover, unlike prior studies such as Zhao and Wang (2024), Kim and Park (2024), Alam et al. (2025), and Chen and Liu (2025), which mainly focus on mobile payment adoption or user engagement outcomes, this study extends the literature by examining continuance intention in QR-code-based mobile payment systems, thereby addressing a less explored post-adoption behavioural stage.

1.5 Scope of Study

This research focuses on mobile payment in Malaysia, whereby the degree of use intention among users is identified through the application of gamification. Gamification consists of nine components, namely Meaning, Accomplishment, Empowerment, Ownership, Social Influence, Scarcity, Unpredictability, and Avoidance. The relationships are explored within the context of mobile payment. However, Empowerment and Scarcity are excluded for reasons that are elaborated in Chapter Two. In addition, this study considers the mediating roles of attitude towards mobile payment and perceived enjoyment, as well as the moderating role of mindfulness in the relationship between gamification and mobile payment use intention. These relationships provide the basis for understanding how psychological and behavioural constructs influence the adoption of mobile payment systems. This study adopts a cross-sectional research design and a purposive non-probability sampling technique. Finally, this study is conducted across all areas in Central Klang Valley to ensure that the findings represent a comprehensive view of mobile payment adoption. The findings are conducted within QR-code-based mobile payment users in Central Klang Valley, and

are based on self-reported continuance intention data, which defines the generalisability boundary of the study.

1.6 Definition of Terms

1.6.1 Gamification

Gamification involves applying gaming elements to boost service delivery and inspire behaviors that create value (Basaran, 2022). Therefore, gamification can be accepted as the use of game elements in mobile payment context to promote the application's usage intention.

1.6.2 Mobile Payment (M-payment)

Electronic payment is any payment made by using digital apps that is involving the payer and the payee where both employ digital mode to conduct transaction (Singh, 2017). Meanwhile, Liébana-Cabanillas and Lara-Rubio (2017) has indicated that mobile payment is the activities involving payment transaction by using electronic wallet in mobile devices.

1.6.3 M-payment Continuance Intention

Continuance intention can be described as a circumstance where people consider to continuing use for a purpose or action that they have taken (Chen et al., 2021). In mobile payment, continuance intention is the degree of user's intention to use mobile payment method to make transactions after they have experienced with the app.

1.6.4 Meaning/Purpose

Meaning can be defined as an individual who feels that he/she was "selected" to perform that action and/or is doing something greater (Chou, 2014). Thus, meaning can be accepted as the user believes that he/she is doing something significant when conducting payment transaction by using digital wallet in mobile device.

1.6.5 Development/Accomplishment

Development is an internal factor for creating progress, building skills and ultimately overpower challenges (Chou, 2014). Development is a motivator for a user

to employ mobile wallet in purchasing a good or service which they are no longer using cash as payment method.

1.6.6 Ownership

The definition of ownership can be accepted as, the users are motivated to use a technology because they feel like they possess and control that technology (Chou, 2014). Thus, ownership is considered as the users are motivated to use mobile payment method because they feel like they own and control the mobile wallet.

1.6.7 Social Influence

Social influence has meaning, the changes that occur in cognition, attitude and behaviour of an individual in which the origin comes from other individual or group (Raven, 2008). Social influence is considered as the degree of a consumer who considers that it is important for others to believe he or she must use mobile payment.

1.6.8 Unpredictability

Unpredictability is considered as an individual constantly being involved in something because he/she could not anticipate what is happening next (Chou, 2014). Unpredictability is when the users are engaged with mobile payment because they are curious if they keep using that payment method.

1.6.9 Avoidance

Avoidance can be accepted as the stimulus to prevent negative things from occurring (Chou, 2014). Thus, avoidance can be referred as the user's motivation to avoid something negative when they use mobile payment method in purchasing goods or services.

1.6.10 Attitude Towards M-payment

Attitude is the tendency to learn and assess things in particular way which involve the assessment of persons, object, events, or issues. This assessment is either positive or negative and uncertain at certain times (Cherry, 2023b). Thus, attitude towards M-payment is the user' tendency and feeling towards mobile payment usage that act as the indicator of the continuance intention to use the app.

1.6.11 Perceived Enjoyment

Perceived enjoyment is an intrinsic motivation that connected with the feeling of enjoyment in the usage process of a system (Praveena & Sam, 2014). Therefore, perceived enjoyment is the degree to which mobile payment usage is perceived to be enjoyable, aside from the performance consequences.

1.6.12 Engagement with Technology

The level of individual's participation in searching details about the functionality of a technology (Sun et al., 2016). The consumer identifies the mobile payment and its functional use in details when using it.

1.6.13 Technological Novelty

The extent to which an individual seeking uniqueness in a technology while comparing with other technologies (Sun et al., 2016). To explore how it is different, the user compares the mobile payment method with other methods when using it.

1.6.14 Awareness of Local Context

The degree of an individual's particular opinion on how the technology relevant to the local context and particular need (Sun et al., 2016). What users think when they use mobile payment method to help in purchasing goods or services.

1.6.15 Cognizance of Alternative Technology

The level of awareness that an individual has in a technology's alternatives and its benefits along with the flaw (Sun et al., 2016). When conducting payment transaction by using mobile payment method, the user is aware of other alternatives such as credit cards or cash.

1.7 Organization of Study

Chapter One introduces the study by providing the background of mobile payment in Malaysia, followed by the problem statement, which outlines the need to conduct this research by recognizing the hindrances identified in past studies. The

chapter then presents the research objectives and research questions, as well as the significance of the study from both practical and theoretical perspectives. It concludes with the scope of the study and the definition of key terms.

Chapter Two reviews the relevant literature related to the study. It begins with an overview of electronic payment in Malaysia, followed by an in-depth analysis of the dependent variable, mobile payment continuance intention. The chapter then provides a review of gamification and its dimensions, along with discussions on attitude towards mobile payment and perceived enjoyment. It further examines the mindfulness model and its components, identifies literature gaps, and discusses previous studies related to mobile payment. The chapter concludes with the conceptual framework of the research.

Chapter Three describes the research design and methodology employed in this study. It begins with the research design and data sources, followed by the sampling design, which includes the target population, sample size, sampling frame, and sampling technique. The chapter also details the data collection methods, including instruments, measurement and scaling, and pilot testing. It continues with an evaluation of the validity and reliability of the instruments and concludes with the data analysis plan.

Chapter Four presents the results of the data analysis and the findings of the study. It begins with descriptive statistics, followed by assessments of measurement validity and reliability. Structural equation modelling (SEM) is then employed to test the hypothesized relationships between gamification, attitude, perceived enjoyment, mindfulness, and mobile payment continuance intention. The chapter discusses the direct, indirect, and moderating effects, highlighting both significant and non-significant results. Comparative discussions are also provided, linking the findings with prior studies and theoretical perspectives to explain consistencies, deviations, and new insights.

Chapter Five concludes the study by summarizing the key findings in relation to the research objectives and questions. It discusses the theoretical contributions, including the extension of gamification into the mobile payment domain, the role of attitude and perceived enjoyment as mediators, and the moderating influence of mindfulness. The practical contributions are also highlighted, particularly the implications for mobile payment providers, policymakers, and system developers. This chapter further acknowledges the limitations of the study, such as contextual boundaries and measurement constraints, and offers directions for future research, including cross-cultural validation, the integration of additional psychological factors, and

technological advancements. The chapter closes with a reflection on the overall significance of the study for advancing knowledge in mobile payment adoption and consumer behaviour.

1.8 Conclusion

As a summary, Chapter One has presented the general information and knowledge of mobile payment. The application of gamification and the inclusion of attitude towards mobile payment, perceived enjoyment, and mindfulness are proposed to further explore the mobile payment domain in Malaysia. Within the research background, the current context of mobile payment among Malaysian users was highlighted. The problem statements have been explained from both practical and theoretical perspectives. Subsequently, the research objectives and research questions were developed to guide the research flow while addressing the main concern of the study. In addition, this chapter has outlined the significance of the study and provided the definitions of key terms involved in the research. Most importantly, the introductions of the dependent variable, independent variables, mediating variables, and moderating variable were presented, which will be further elaborated in the following chapter.

CHAPTER 2
LITERATURE REVIEW

2.1 Reviews on Digital Payment

The proliferation of digital payment has not been fully utilized even though Internet usage has already experienced explosive growth. Previously, consumers were not familiar with the Internet and only used it as a medium to accumulate information and increase knowledge. However, in recent years, consumers have increasingly relied on this medium to conduct transactions such as payments through applications. The growing need among consumers to perform payment transactions has triggered the intention to adopt new payment tools, such as mobile wallets, which allow more convenient and flexible transactions (Karim et al., 2020).

Digital payment has become a significant component of modern electronic commerce (e-commerce). Consequently, it has attracted considerable attention from researchers, scholars, and information system developers. Several interpretations and definitions have been offered by scholars from different fields. According to Kabir et al. (2015), digital payment has been primarily defined within the disciplines of business technology, accounting and finance, and information systems. From a marketing perspective, digital payment may be accepted as any form of transaction conducted digitally without the use of physical cash.

The use of digital payment services brings both advantages and disadvantages to consumers. Providers typically offer various incentives to reward users, including reward points, cashback, discounts, or promotions. In addition, users are able to perform money transfers effortlessly and even split bills within a single receipt (Yan et al., 2021). Over the years, providers have improved their services in terms of security, convenience, and safety. For example, user details are encrypted and not stored directly on mobile devices (Damen, 2022). However, concerns regarding security and confidentiality remain. Rathore (2016) highlighted that issues of safety regarding account details and credited funds are still a major concern. Moreover, the novelty of mobile payment systems may expose users to risks such as malware, hacking, or phishing attacks during payment transactions (Yuen, 2019).

Despite technological advancements, digital payment transactions can sometimes be interrupted by Internet unavailability, which occurs most frequently in rural areas (Rathore, 2016). In situations where the Internet is inaccessible or when the device battery is depleted, users are left with no option but to rely on cash. Furthermore, the intangibility of digital payment increases the tendency for overspending. First-time users may also delay adoption due to the inconvenience of frequent application updates (Hsian, 2019). Nevertheless, these challenges are subjective in nature and may evolve over time.

The forms of digital payment vary across countries, with several methods emerging as global trends. Caramela (2022) highlighted five prominent digital payment methods currently in use. The first is biometric authentication, which uses facial recognition, iris recognition, fingerprint scanning, vein mapping, or heartbeat evaluation to process transactions and prevent identity fraud. The second is the mobile point of sales (mPOS), which employs a card reader or application installed on tablets, mobile devices, or other wireless devices to facilitate digital payments. The third is the use of smart speakers, whereby consumers can issue voice commands through devices such as Google Home or Amazon Echo to instantly pay for goods and services. The fourth is social media payment options, which enable peer-to-peer payments or transactions between users and merchants within a social networking platform. Finally, the fifth method is contactless payment or mobile payment applications, which require users to create an account, store payment details, and conduct financial transactions such as bill payments, purchases, or money transfers with ease. However, the prevalence of these methods differs across countries. In Malaysia, contactless mobile payment applications, particularly mobile wallets and QR code-based payment systems, have emerged as the most widely used forms of digital payment. QR-code payment requires active scanning and interaction. This makes user engagement more important compared to passive payment methods.

Despite the widespread growth of digital payment technologies, prior studies have examined digital payment from different perspectives, including adoption, acceptance, usage, and continuance. Adoption and acceptance studies generally focus on factors that influence consumers' initial willingness to try or accept a digital payment service, whereas usage studies examine the extent to which consumers utilize the service after adoption. In contrast, continuance studies investigate the factors that

motivate users to sustain their usage over time after gaining actual experience with the technology.

Although adoption-focused studies have contributed substantially to understanding the initial uptake of digital payment services, their explanatory power may be limited in explaining long-term user behaviour. As digital payment technologies become increasingly mature and widely available, the challenge for service providers is no longer merely attracting new users but encouraging existing users to continue using the service. Consequently, post-adoption factors such as satisfaction, habit formation, affective experiences, and ongoing value perceptions have gained greater attention in continuance research. This shift highlights the importance of examining digital payment from a continuance perspective rather than focusing solely on initial adoption.

In order to comprehend the broader digital payment ecosystem, this research narrows its focus specifically to mobile payment in Malaysia, which represents one of the fastest-growing yet still underutilized methods of digital payment (Caramela, 2022). Given the increasing maturity of mobile payment services and the availability of alternative payment methods, understanding users' continuance intention has become particularly important for ensuring sustained usage and long-term platform success.

2.2 Reviews on Mobile Payment in Malaysia

Malaysia is currently advancing towards Fintech 4.0, driven by the rise of innovative financial platforms. The positive responses in the acceptance and usage of mobile payment, e-commerce, digital financial services, banks, and payment providers have directly shaped user behaviours. Following the transition into the endemic stage of Covid-19 and a gradual return to normalcy, the government has continued to promote mobile payment adoption. Simultaneously, the population has become increasingly accustomed to the use of mobile payment in daily transactions.

According to Dwivedi et al. (2017), mobile payment user behaviour towards its acceptance demonstrates strong growth as a result of global demand for digital transactions. They argued that researchers have broadly explored this concept, investigating mobile payment from multiple perspectives. This payment method has been regarded as a universal solution for both merchants and consumers, exerting a significant influence on consumer intention and technology usage. Consistent with this view, prior research has found that users tend to adopt technologies that are quick, easy

to use, and functionally efficient. Within this context, mobile payment offers multipurpose capabilities, fulfilling these characteristics (Abhishek & Hemchand, 2016). Broadly defined, mobile payment is a payment service operated under financial regulations, where transactions are conducted through mobile wallets, typically using a debit method whereby funds are reloaded into the wallet.

The evolution of Malaysia's payment ecosystem can be traced back to the late 1990s, when network-based and Internet-based payment methods first emerged, coinciding with advancements in information and communication technology. In 2004, the government introduced online payments by replacing magnetic stripe ATM cards with MEPS-issued bankcards. The expansion of payment services accelerated in 2005 with the introduction of additional service providers and methods, followed by mobile-to-mobile cross-border money transfers and cross-border ATM withdrawal services in 2006. This historical trajectory reflects both the introduction of new payment methods and the continuous development of existing ones (Basir, 2009).

Policy frameworks have also played an important role in fostering digital payment adoption. The Malaysia Financial Sector Blueprint 2011–2020 outlined an ambitious goal to raise electronic payments per capita to 200 by 2020, a figure comparable to that of certain developed countries. In 2017, the industry-wide PIN and PAY initiative mandated the use of PIN for all card transactions, strengthening security measures. By 2020, Malaysia had also set its sights on expanding the ubiquity of mobile wallets as part of its transition toward a cashless society.

Globally, electronic payments have become a prominent trend, with mobile wallets in particular experiencing significant proliferation. The adoption of both ACH-funded and card-funded digital wallets has been predicted to rise in the near future. According to Juniper Research (2025), mobile wallets are projected to experience an absolute growth of 129 percent between 2022 and 2027 worldwide, including Malaysia. This projection reinforces the expectation that Malaysia's financial ecosystem will continue progressing toward widespread mobile payment adoption.

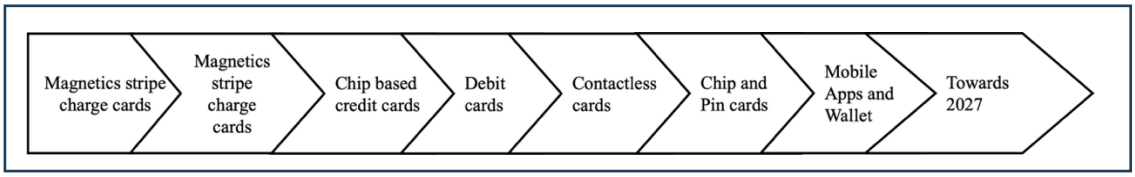

Figure 2.1 The History and Milestones of Digital and Mobile Payments in Malaysia

The development of mobile payment has transformed the mobile phone into a multifunctional device that enables users to purchase food, buy tickets, and book hotel accommodation. According to Kim et al. (2016), the mobile payment service market is largely driven by the convenience of easy payment services, resulting in rapid growth, particularly within developing economies. The industry continues to evolve through innovative systems such as Apple Pay, which allows users to manage funds and perform transactions seamlessly (Kang, 2018).

Globally, China and India hold the largest share of mobile payment usage among Internet consumers. In particular, WeChat Pay, with 600 million users, and Alipay, with 400 million users, are recognized as the world's leading mobile payment providers (Xie, 2025). These platforms have reshaped the global financial landscape and demonstrated the potential scale of mobile payment adoption.

In Malaysia, although the population is below 40 million, the country has seen considerable growth in digital payment infrastructure. To date, Malaysians are supported by 54 licensed e-money issuers recognized by Bank Negara Malaysia (BNM). Based on information retrieved from the official BNM website, these comprise six bank e-money issuers and 48 non-bank e-money issuers, all of which are linked to digital payment or wallet products. The list of e-money issuers in Malaysia is presented in Table 2.1 below.

Table 2.1
List of E-money Issuers (Bank and Non-bank) in Malaysia

Bank	**Non-bank**
AmBank (M) Berhad	AEON Credit Service (M) Berhad
Bank of China (Malaysia) Berhad	Alipay Malaysia Sdn Bhd (formerly known as helloPay Malaysia Sdn Bhd)
CIMB Bank Berhad	Axiata Digital E-code Sdn Bhd
Malayan Banking Berhad	Bandar Utama City Centre Sdn Bhd
MBSB Bank Berhad	Bayo Pay (M) Sdn Bhd
RHB Bank Berhad	BigPay Malaysia Sdn Bhd
	BLoyalty Sdn Bhd
	Chevron Malaysia Limited
	Dataprep Payment Solutions Sdn Bhd
	DIV Services Sdn Bhd (formerly known as ePetrol Services Sdn Bhd)
	Fass Payment Solutions Sdn Bhd
	FINEXUS Cards Sdn Bhd (formerly known as MAA Cards Sdn Bhd)
	Fullrich Malaysia Sdn Bhd
	Gkash Sdn Bhd
	GoNetPay Sdn Bhd (formerly known as GoPay Sdn Bhd)
	Google Payment Malaysia Sdn Bhd
	GPay Network (M) Sdn Bhd
	i-Serve Payment Gateway Sdn Bhd

Bank	Non-bank
	Instapay Technologies Sdn Bhd
	JuruQuest Consulting Sdn Bhd
	Kiplepay Sdn Bhd (formerly known as Webonline Dot Com Sdn Bhd)
	ManagePay Services Sdn Bhd
	Maxis Broadband Sdn Bhd
	Merchantrade Asia Sdn Bhd
	Mobile Money International Sdn Bhd
	MobilityOne Sdn Bhd
	MOL AccessPortal Sdn Bhd
	MRuncit Commerce Sdn Bhd
	MyEG Alternative Payment Services Sdn Bhd
	PayPal Pte Ltd
	Petron Fuel International Sdn Bhd
	Presto Pay Sdn Bhd (formerly known as EPP Solution Sdn Bhd)
	qBayar Sdn Bhd
	Raffcomm Sdn Bhd
	Serba Dinamik IT Solutions Sdn Bhd
	Setel Ventures Sdn Bhd
	ShopeePay Malaysia Sdn Bhd
	SiliconNet Technologies Sdn Bhd
	SMJ Teratai Sdn Bhd
	TNG Digital Remittance Sdn Bhd (formerly known as Numoni DFS Sdn Bhd)
	TNG Digital Sdn Bhd
	Touch 'n Go Sdn Bhd
	True Money Malaysia Sdn. Bhd.
	U Mobile Services Sdn Bhd
	Uni Comms International Sdn Bhd
	WannaPay Sdn Bhd (formerly known as ScanPay Sdn Bhd)
	Wavpay Systems Sdn Bhd
	WeChat Pay Malaysia Sdn Bhd
	Wise Payments Malaysia Sdn Bhd
	XOX Com Sdn Bhd

Since the Covid-19 pandemic, the usage of mobile payment has surged and become increasingly popular among Malaysians. With 54 licensed providers available, users are presented with a wide variety of options and are able to select the platforms that best suit their preferences. Among these, six providers are most favoured in Malaysia: Boost, GrabPay, Touch ‘n Go, WeChat Pay, MAE, and BigPay.

Boost, owned by Axiata Group, can be used at more than 140,000 touchpoints, including both online and physical merchants that accept UnionPay cards. It also enables the payment of utility bills such as Astro, Syabas, Telekom, and DBKL parking. GrabPay, owned by Grab, facilitates transactions for shopping, mobile credit top-ups, food delivery, and rides. Its strategic partnership with Maybank allows cross-platform functionality. Touch ‘n Go (TnG), backed by Alipay and Touch ‘n Go, serves more than 140,000 merchants nationwide and is accepted at all tolls, bus ticketing counters, KLIA

express and transit, taxis, and food delivery services. WeChat Pay, owned by Tencent, made Malaysia the first country outside China to enable its services. Accessible through Mastercard and Visa debit cards recognized by local banks, it supports prepaid plans, bus tickets, and airline ticket purchases. MAE, backed by Maybank, is open to both Maybank and non-Maybank users, with access to more than 200,000 QR Pay merchants. Lastly, BigPay, 70% owned by AirAsia, offers not only digital payment services but also credit card-like features, enabling both online purchases and ATM withdrawals.

The evolution of mobile payment represents a significant contribution to strengthening the financial system. By reducing transaction costs and improving liquidity and resource allocation, mobile payments create benefits across the financial sector (Sidek, 2015). Recognizing this, the Malaysian government has actively promoted adoption through initiatives such as the ePenjana programme and the DuitNow QR initiative. DuitNow, developed by Payment Network Malaysia Sdn. Bhd. (PayNet) under Bank Negara Malaysia's Interoperable Credit Transfer Framework, was introduced to accelerate the uptake of electronic payments. Its objective is to ensure that mobile payment is accessible across the spectrum of businesses, from large corporations to micro-merchants such as market vendors and roadside stalls. By employing the national QR standard, DuitNow allows users to make instant and secure transactions across banks, mobile applications, and major digital wallets.

From a technological standpoint, mobile payments are generally classified as either contactless or remote, depending on the underlying supporting technology (Mun et al., 2017). More specifically, mobile payments can be divided into two categories: business model and proximity (Dahlberg et al., 2015). Business model classification is based on consumer relationships, including peer-to-peer (P2P), consumer-to-consumer (C2C), or business-to-consumer (B2C) transactions. Proximity classification, in contrast, is determined by the physical location of the user. This involves remote payments, such as online transactions via mobile devices, or close-proximity payments, such as in-store transactions.

The increasing penetration of smartphones and mobile applications has accelerated the adoption of NFC- and QR-code-based technologies, which are more convenient compared to earlier SMS-based payment systems. NFC-based mobile payment relies on radio frequency to connect a smartphone directly with a merchant's RFID terminal, whereas QR-code-based payments require only the scanning of a

displayed or printed QR image, making the process simple and entirely contactless (de Luna et al., 2019).

Electronic payment systems also differ according to their technological bases. While many require Internet access for transaction processing, close-proximity payments can be conducted in real time at physical counters. In Malaysia, QR-code- and NFC-based technologies are the most commonly selected methods for over-the-counter payments. Given their growing relevance, this study focuses specifically on QR-code-based mobile payments as a form of close-proximity payment. The differences between NFC-based, QR-code-based, and Internet-based mobile payments are summarized in Table 2.2 below.

Table 2.2
NFC vs QR-Code vs Internet

Category	Description	Pros	Cons	Example
NFC	E-wallet that includes secure element either inserted in the device or employ HCE (Host Card Emulation) in the cloud	Very fast, secure, flexible	Limited to PoS terminal that provide NFC, Distance limitation	ApplePay, Samsung Pay
QR-code	Transactions can be made by scanning Qr-code that provided by merchants or in the user's device.	Very simple and quick application, Do not require any physical contact	Can be difficult to read in less-than-ideal lighting conditions	Touch n Go, Boost, Grabpay, WeChat Pay, AliPay
Internet	Created only for online uses	Simple to install	Cannot be used in physical world	Paypal

2.3 QR-code Based Mobile Payment

We are living in the digital age, where technology has been constantly transformed and developed. These changes have affected consumer preferences, behaviours, and actions in many ways. Naturally, users prefer goods or services that incorporate friendly, efficient, and reliable technology. The challenge, however, is that while customer service is guided by timeless essential principles, consumer anticipations are constantly evolving. With the mass penetration of smartphones, the Internet, and other advanced technologies, users now expect instant transactions when engaging in online shopping, searches, or payments. Since QR code represents one of the outstanding benefits offered by digital technology, its usage must be further encouraged in the mobile payment field.

The history of QR code can be traced to the late 1980s when two-dimensional (2D) barcode technology was created. In September 1994, Denso Corporation, a Japanese company, developed the 2D matrix code symbol known as the QR code (Gundaniya, 2020). The term "QR code" is derived from "Quick Response Code." Initially, QR code emerged out of necessity, functioning primarily as a barcode for supermarkets. Although QR codes and barcodes are similar in practice, QR codes are more flexible, as they store information both horizontally and vertically, unlike barcodes that only store information horizontally. Furthermore, QR codes are versatile as they can be read from both paper and screens, whereas barcodes can only be scanned by laser from paper. The example of QR code and barcode is presented below.

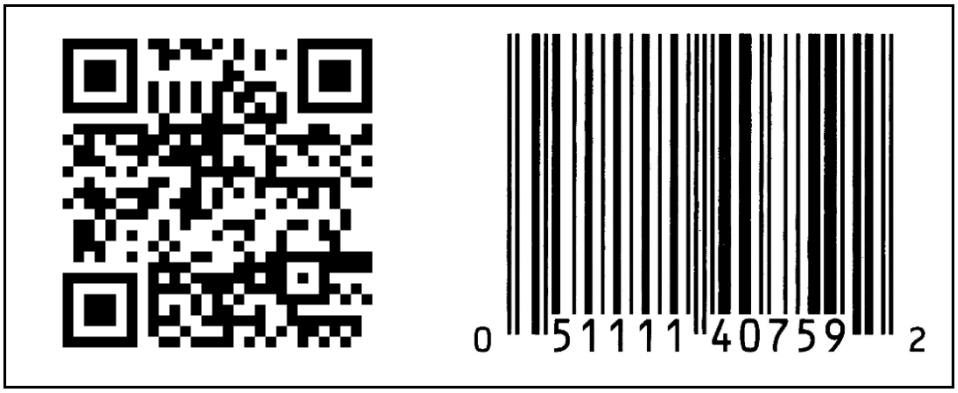

Figure 2.2 The Example of Image of QR-code and Barcode

Approximately in the 1990s, QR codes began to be broadly used in marketing campaigns to build relationships with consumers. With the emergence of smartphones, QR code has become a common trend in mobile payment (Sorensen, 2019). Its popularity is attributed to strong features such as anti-counterfeiting, the ability to encode Chinese words and images, confidentiality, large data capacity, and reliability. QR code technology is also recognised for its ability to authenticate identical information of entities, ensuring novelty and uniqueness (Goyal et al., 2016). Presently, QR code is the most employed method for conducting payment transactions, requiring only the scanning of a code via smartphones. The scanning process is seamless if the user's smartphone or tablet is equipped with a barcode reader and a built-in camera. Both iPhones and Android devices are capable of reading QR codes directly through their default camera applications, provided the devices operate on recent iOS or Android software (Sorensen, 2019).

Internationally, countries such as China, India, Brazil, and the United States have already successfully embraced QR code-based mobile payment. For example, QR code is highly popular in China not only because of its ease of use but also because cash and card payments are minimally employed outside rural areas. In Malaysia, recent years have witnessed the establishment of QR code-based mobile payment with leading providers such as Boost, Maybank QR Pay, and Touch 'n Go mobile wallet. This payment method has gained significant attention, particularly among millennials (Fathin et al., 2020). Importantly, QR code payment is provided by both non-bank-based providers (e.g., Touch 'n Go, Boost) and bank-based providers (e.g., Maybank MAE, CIMB Octo, GoApp Bank Islam). The table below shows the differences between non-bank and bank-based providers.

Table 2.3
Differences Between QR-Code M-payment Provider Types

Characteristics	**QR-code M-payment provider type**	
	Non-bank / independent	**Bank-based**
Leading brands	Touch-n-Go e-Wallet (TnG eW), Boost, GrabPay,	Maybank MAE, CIMB Octo.*
Affiliation with financial institutions	Operate independently and not affiliated with financial institutions.	Directly associated with traditional banks or financial institutions
Real-time integration with bank services	No direct access to traditional banking products.	Access to traditional banking services, such as savings accounts, loans, and investment products.
Credit reloads	Need to preload or top-up credits.	No need to reload credits. Accounts are directly linked to existing bank accounts, which provides seamless fund transfers.
Unique value proposition	Offer a broader range of applications beyond payments, such as transportation (e.g., GrabPay TnG eW), cashback rewards, and loyalty programs.	Comprehensive financial management solutions including viewing account balances, conducting fund transfers, and making investments in a single app.
Target audience	The simpler sign-up process allows participation of a diverse user base (e.g. unbanked society and those who are not necessarily customers of traditional banks).	Existing bank customers who seek integrated mobile banking and payment solutions.

Referring to the Table 2.3, each type of provider offers unique benefits and limitations. Bank-based providers are distinguished by their integration with traditional banking services, which eliminates the need for preloaded credits. In contrast, non-bank providers are popular for their added-value features such as cashback, rewards, and

loyalty programmes. They also expand beyond payment transactions into other services. For instance, GrabPay incorporates transportation and food delivery within its platform, while Touch ‘n Go provides toll reloads, train and bus fares, and parking payments.

Another key comparison lies between QR code-based payment and NFC-based payment. To support NFC, merchants are required to invest in costly POS terminals, while users must own smartphones equipped with NFC functionality linked to credit or debit cards issued by participating banks. For instance, SamsungPay and ApplePay were among the earliest NFC-based providers. However, the high hardware cost and card subscription requirements have led users to perceive QR code-based payment as a more accessible alternative. Unlike NFC, QR code payment requires no special hardware or card subscription, relying instead on smartphone cameras to scan merchant-provided codes. This makes QR-based mobile payment simpler and more cost-effective for both users and merchants.

Khazanah Nasional Berhad (2019) emphasised that among mobile payment methods, providers themselves favour QR code as the preferred option for serving users. Yan et al. (2021) further suggested that factors influencing QR code mobile payment adoption must be identified as a matter of urgency. To accelerate adoption, Bank Negara Malaysia and Bank Indonesia (BI) launched a cross-border QR code payment initiative in the third quarter of 2022. This initiative enables secure, instant, and efficient transactions between Malaysia and Indonesia, allowing consumers to complete purchases by scanning either DuitNow QR codes or the Quick Response Code Indonesian Standard (QRIS).

The rising adoption of QR code-based mobile payment contributes significantly to the vision of a cashless society. Additionally, scholars have highlighted that QR codes offer public health benefits, particularly in reducing the spread of Covid-19 (Yan et al., 2021). While earlier studies on mobile payment largely focused on its characteristics and user-centric factors (Kim et al., 2016), limited research has explored the rapid proliferation of QR codes in the mobile payment domain. Specifically, there remains a gap in understanding whether the Covid-19 pandemic has served as a catalyst for the acceleration of QR code-based payment systems (Tu et al., 2022).

2.4 M-payment Continuance Intention

Formerly, the Internet was mainly recognised as a source to gain information and knowledge. However, despite its explosive growth, mobile payment was not fully utilised during its early years. Fortunately, people have now begun to use the Internet to make payment transactions through applications on their mobile devices. The ubiquity of mobile payment can now be observed across the world, including in Malaysia. The Covid-19 pandemic, which affected Malaysia since 2020, accelerated this development. When the government enforced the Movement Control Order (MCO) on March 18th, 2020, people's movement into or out of zones was restricted (Shah et al., 2020). Consequently, there was an increasing need for consumers to conduct cashless transactions, which stimulated their intention to adopt new payment methods such as mobile payment wallets or e-wallets, making payment transactions more convenient and flexible (Karim et al., 2020). As a result, mobile payment started to be acknowledged widely. However, the emergence of many brands of mobile payment sparked fierce competition among providers. This competition placed them in an intense situation where they had to strongly stimulate users' continuance intention in order to sustain long-term profitability.

A deep understanding of behavioural intention is therefore needed, as it plays a significant role across many fields. Research on behavioural intention has been widely conducted (Gurjeet, 2015), with previous studies showing that various predictors influence consumer behavioural intention (Jeffrey & Ann, 2016). Consumer behavioural intention is a complex process involving consumer preferences towards the usage of goods or services under certain conditions (Soodan & Rana, 2020). From a business perspective, usage intention is highly crucial as it can lead to purchases of goods and services, thereby exerting a strong impact on sales performance. A small shift in factors influencing usage intention can significantly alter consumer favourability, either positively or negatively (Martinez & McAndrews, 2022).

Consumer perspectives towards a service may also shift after gaining experience with it (Schuster et al., 2015). Thus, it is important to distinguish between adoption and continuance intention, as these represent different contexts influenced by different determinants (Humbani & Wiese, 2019). Past research has highlighted contradictions in this area, suggesting that further studies are required to better understand the factors influencing both adoption and continuance intention of technology use. Indeed, the

adoption of an information technology (e.g., mobile payment) cannot be considered successful until its continued usage is established (Thong et al., 2006). This is particularly important as corporate failures are often linked to irregular, inefficient, and ineffective long-term technology usage (Bhattacherjee, 2001).

According to Vanduhe et al. (2020), continuance intention refers to the degree to which a user who currently employs a mobile device to purchase goods or services has formed a conscious plan to continue using the application in the future. Similarly, Chen et al. (2021) described continuance intention as the condition where individuals consider continuing to use a product or service after initial adoption. Therefore, in this study, mobile payment continuance intention is defined as the degree of users' intention to continue making transactions via mobile payment methods after having prior experience with the application.

It is important to note that usage intention and continuance intention differ in their formation. Usage intention is created by non-users or early-stage users at the pre-usage stage and involves motivational factors that influence consumer behaviour (Peña-García et al., 2020). In contrast, continuance intention is formed by individuals who have already used the product or service (Chen et al., 2021). The significance of mobile payment continuance intention lies in its ability to measure users' desire for new products (Morwitz, 2014). It also serves as a key standard for future demand forecasting and for evaluating the effectiveness of marketing efforts. Moreover, Ladkoom and Thanasopon (2020) emphasised that consumers' perceptions of a product, service, or brand can be reflected through their continuance of use.

Numerous studies on mobile payment have been conducted, particularly those aiming to develop and test models evaluating usage intention and/or actual technology usage by individuals or organisations. However, literature on continuance intention remains comparatively limited. Existing works on continuance intention are typically framed within the broader category of digital technologies, which include: (1) online communities (information sharing and social networking), (2) online finance (e.g., mobile payment, online banking), (3) online/virtual learning platforms, (4) e-services (intangible online goods/services), (5) e-commerce (purchasing/selling products online), and (6) online entertainment (applications providing entertainment, excluding social networking) (Yan et al., 2021).

2.5 Flow Theory as underpinning Theory of Study

The quantitative research approach is designed to empower researchers to investigate natural phenomena, objectively measure the social world, and predict and comprehend human behaviour. Quantitative method is an examination of social or human issues, grounded in the testing of a theory comprising variables quantified and assessed using statistical procedures. This process aims to ascertain the validity of predictive generalizations derived from the theory (De Vos et al., 2020). Gregor (2002) indicated that underpinning theories act as frameworks to comprehend the social context in IS studies. These theories are formed to identify the "how" and "why" behind the occurrences in a particular manner. The order in which underpinning theories are employed influences and shapes the collection, organization, and analysis of data (Iyamu, 2013).

In line with this, it is crucial to first establish the general role of underpinning theories in research before narrowing down to those most relevant to gamification and mobile payment studies.

Theories that form the foundation of a study do not anticipate the study's findings. Instead, they aid comprehension of a situation and provide an explanation of why and how events unfold as they do. These theories play a crucial role in Information Systems (IS) research by offering insights into IS/IT artifacts, particularly from sociotechnical perspectives (Mkhomazi & Iyamu, 2013). An underpinning theory serves as the base of a study and is commonly relied upon for various reasons, including: (1) uncovering dependencies and relationships between variables within a context; (2) providing guidance in interpreting empirical data collected over time and within a particular context; (3) generating awareness of social events, processes, and activities happening in the development, implementation, and practice of information technology and systems; and (4) minimizing the gap between assumptions and anticipations of actions within a given context (Mkhomazi & Iyamu, 2013).

Having clarified the general role of theories, it is important to turn attention to frameworks that guide the understanding of user engagement in digital contexts. One of the widely used frameworks in this domain is the Octalysis Gamification Model.

The Octalysis Gamification Model, formulated by Yu-Kai Chou in 2014, is predominantly regarded as a framework rather than a theory. It serves as a gamification framework designed to scrutinize and formulate captivating experiences by identifying

and incorporating eight fundamental drives or motivators that impact human behaviour. While the Octalysis framework proves valuable in structuring the analysis and design of gamified experiences through the consideration of these eight core drives, it lacks a comprehensive theoretical foundation equipped with predictive capabilities or inherent causal relationships between variables. Instead, it functions as a practical tool for gamification practitioners and designers, facilitating the creation of engaging user experiences.

Although the Octalysis framework effectively identifies the gamification drivers that can influence user behaviour, it does not explain the underlying psychological mechanisms through which these drivers affect users' perceptions and responses. Therefore, a complementary theoretical perspective is required to explain why gamification features influence users' experiences and behavioural outcomes. In this regard, Flow Theory is adopted as a supporting theoretical lens because it explains how engaging and enjoyable experiences generated through system interaction can shape users' attitudes and perceptions.

Because of these limitations, it becomes necessary to identify a suitable underpinning theory that can complement the Octalysis framework by providing predictive power and theoretical grounding. In this study, Flow Theory is selected to serve this role. Because of these limitations, it becomes necessary to identify a suitable underpinning theory that can complement the Octalysis framework by providing predictive power and theoretical grounding. Hence, to conduct this study appropriately, Flow Theory is selected as the relevant theory that could underpin the Octalysis Gamification Model. According to Flow Theory, individuals are inclined to persist in using a technology when immersed in a state of flow, marked by intense focus, a feeling of control, and a diminished self-awareness (Csikszentmihalyi, 1990). In relation to gamification, to enhance the mobile payment user experience and foster a flow-like state, gamification can be employed, integrating features like challenges, feedback, and rewards.

The hypotheses developed in this study are derived from the central premise of Flow Theory that individuals are more likely to develop positive responses toward an activity when it provides an engaging and enjoyable experience. In the context of mobile payment, gamification drivers such as meaning, development, ownership, social influence, unpredictability, and avoidance are expected to enhance users' psychological involvement and enjoyment during system interaction. These positive experiences

subsequently influence users' attitudes and perceived enjoyment, which are important determinants of continued intention to use mobile payment services.

To better appreciate this connection, it is necessary to revisit the origin and evolution of Flow Theory. Introduced by Csikszentmihalyi (1975) in his ground-breaking book Beyond Boredom and Anxiety, the concept of “flow” was not entirely novel, sharing similarities with Maslow's (1964) idea of "peak experience" and Laski's (1961) accounts of ecstatic experiences. Nevertheless, Csikszentmihalyi's approach was notably more systematic and grounded in empirical research compared to previous perspectives. In the years following its introduction, flow became the focal point of numerous empirical studies across diverse fields, including educational psychology, recreation and leisure sciences, game design, and various others (Abuhamdeh, 2020).

The objective of Flow Theory was to concentrate on individuals undergoing peak experiences, driven by intrinsic motivation, and engaged in both playful and real-life activities. The aim was to identify commonalities in their experiences, motivation, and the circumstances that generate enjoyment (Csikszentmihalyi, 1975). Csikszentmihalyi's conceptualization of flow is evidently centred on it being a pleasurable experience. Indeed, the enjoyable aspect of flow, along with the positive impact it has on motivation, has positioned it as a means for skill development and personal growth, signifying increased "complexity" (Csikszentmihalyi & Rathunde, 1998). Csikszentmihalyi has remained consistent with this initial understanding. In recent collaborative works with his colleagues, the pleasurable and "autotelic" (intrinsically rewarding) nature of flow has been consistently underscored (Nakamura & Csikszentmihalyi, 2009; Nakamura et al., 2019).

From this perspective, Flow Theory offers the necessary theoretical foundation to explain why users sustain engagement in mobile payment systems, particularly when gamification elements are applied. Flow Theory and the Octalysis Gamification Framework perform complementary roles in this study. Octalysis identifies the specific gamification drivers that can be incorporated into mobile payment systems, whereas Flow Theory explains the psychological processes through which these drivers generate engaging and enjoyable user experiences. Therefore, the Octalysis Framework provides the structural foundation for the study, while Flow Theory offers theoretical support for understanding how gamification influences users' attitudes, perceived enjoyment, and continuance intention.

2.6 Gamification

Game is fun, and it holds a unique place in an individual's cultural consciousness. It is possible to say that almost everyone on earth has played at least one game in their lives. Games are considered common; however, they are seldom valued as much as other media such as books or films. Sid Meier, a renowned game maker, once stated that "game is a series of interesting options." It can be enjoyed, but like a guilty pleasure, games often tend to be played secretly. Enjoying a game is an act of explication because it reveals how we think and who we are. Over time, however, the role of games has evolved, extending beyond mere amusement toward applications in more serious contexts such as education, healthcare, and business (Pang, 2017).

Behaviour can be positively shaped by using the right techniques. The elements and principles of games can be applied into non-game contexts, which has emerged as one of the key strategies in shaping behaviour given its motivational properties (Deterding et al., 2011). This set of ideas is acknowledged as gamification. It has been widely recognized as a relevant approach to address the challenges of motivation and engagement, rather than serving only as a form of entertainment (Mora et al., 2017). According to Brito et al. (2015), there are certain similarities between games and collaborative software. Although gamification would not transform an application into a game, its implementation in collaborative systems remains feasible. This illustrates the growing recognition of gamification as a powerful behavioural tool across different digital domains.

Huotari and Hamari (2017) indicated that the conceptual understanding of gamification is still limited, even though it has already been implemented in several fields such as education (Denny, 2013; Bonde et al., 2014), logistics (Klemke et al., 2014), commerce (Bittner & Shipper, 2014; Hamari, 2015), and healthcare (Jones et al., 2014; Hamari & Koivisto, 2015). They further emphasized that a clear and unified definition of gamification is still lacking.

If the definition is drawn from Deterding et al. (2011), gamification is regarded as the application of game elements, criteria, or design in non-game settings without regard to the particular intention of use, implementation medium, or context. However, this definition was contested by Werbach (2014), who argued that not every game element employed in a non-game setting should be considered gamification. For instance, the display of a progress bar in a computer program should not be labelled

gamification because it is merely intended as a feedback tool, with no playful or gameful intention. In contrast, the progress bar used in LinkedIn is intended to stimulate a game-like user experience. Hence, gamification should be understood as the process of conducting activities in a more game-like manner (Werbach, 2014). Similarly, Högberg et al. (2019) defined gamification as a process of modifying any service, product, system, activity, or structure into one that offers experiences similar to those offered by games, which are often referred to as gameful experiences. Meanwhile, Basaran (2022) described gamification as the application of gaming features to increase service provision and motivate value-creating behaviours. Drawing from these views, gamification in this study is defined as the use of game elements in the mobile payment context to promote the application's usage intention.

Kim (2015) and Schell (2014) have agreed that games are capable of driving people's intrinsic ability to take action in solving problems and facilitating learning across different domains. This is because the diverse criteria of games can be employed to promote intrinsic motivation in users (Brito et al., 2018). In terms of application integration, the usage of mobile applications is considered an evolution of applications originally designed for social media services (Oghuma et al., 2016). This suggests that mobile applications can influence users to extend their communication activities beyond utilitarian purposes, embedding themselves more deeply into everyday behaviour.

Building on this perspective, gamification is particularly relevant in the mobile payment context, where sustaining user engagement and motivation is a critical challenge. Engagement and motivation toward mobile payment applications among users can be enhanced through gamification strategies (Akhtar et al., 2023). Gamification has been shown to positively impact users' attitudes towards mobile payment apps (Al-Adwan & Al-Majali, 2018). This finding is further supported by Alshurideh et al. (2019), who revealed that user motivation can be significantly strengthened by incorporating gamification elements. However, existing research on the relationship between gamification and mobile payment adoption remains limited, as certain studies only capture part of gamification's potential role (Yang et al., 2023).

It has been widely acknowledged that gamification is highly desirable in mobile applications (Brito et al., 2018). For instance, Andriotis (2014) found that more than 70 percent of young users perceive their activities as easier and more productive when tasks are gamified through mobile applications. Consequently, gamification can be

considered a reliable and practical foundation for investigating mobile payment continuance intention.

2.6.1 Octalysis Gamification Framework

Octalysis gamification created by Yu-Kai Chou in 2014 is selected for this study. This framework shaped as an octagon not merely for aesthetic purposes, but each placement of core drivers indicates different nature of these elements. It consists of eight placements that is divided into two sides, right-brain octagon and left-brain octagon. The figure below is the gamification framework that provided by Chou (2014).

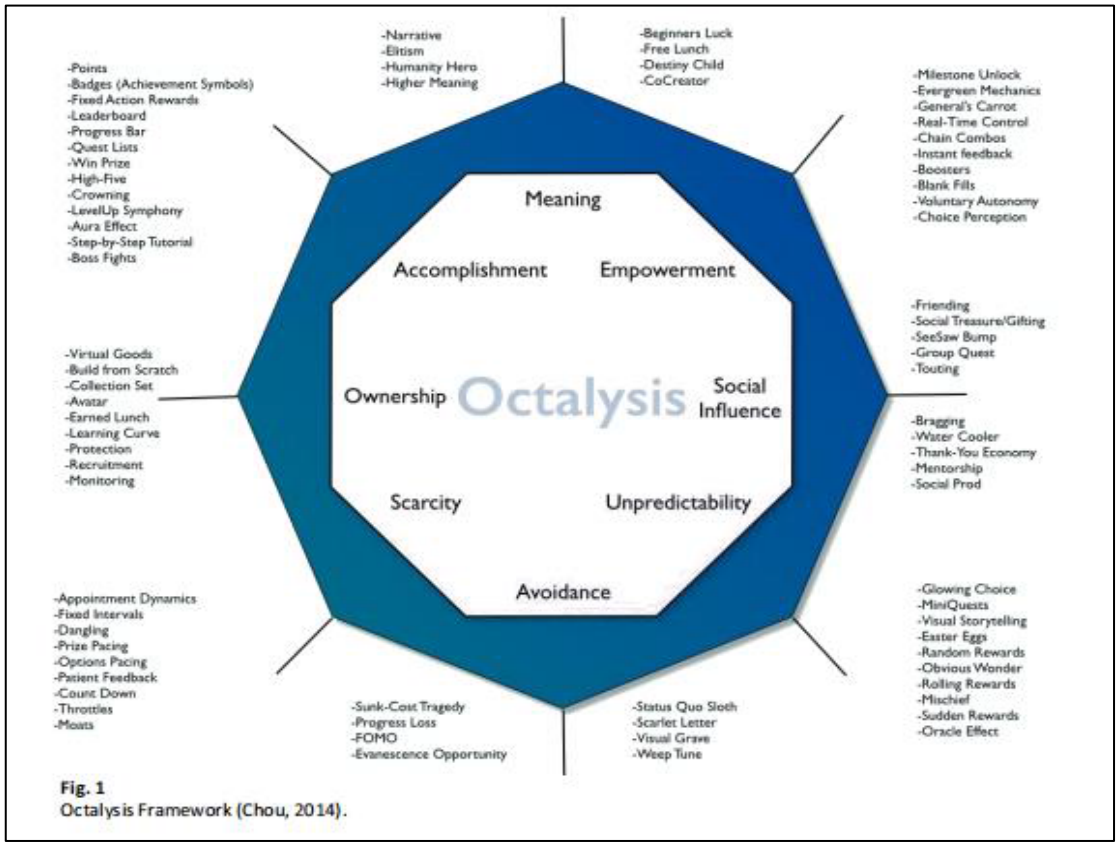

Figure 2.3 Octalysis Gamification Framework

The right-brain and left-brain references are just a symbolic of contrast between two different functions of the brain where the main aim is to make octalysis framework more actionable. The right-brain elements are majorly linked with intrinsic motivation, mainly emphasize on social dynamics, creativity, and self-expression. Meanwhile, on the left-brain side, the elements are mostly associated with extrinsic motivation that commonly come with logic, ownership, and calculation. By which, the users are

motivated to achieve their goals, rewards, or anything that they cannot obtain. Emphasized by Chou (2014) motivations and actions won't take place if there are absence of these core drivers of gamification. The figure below shows the left-brain vs right-brain core drives in framework.

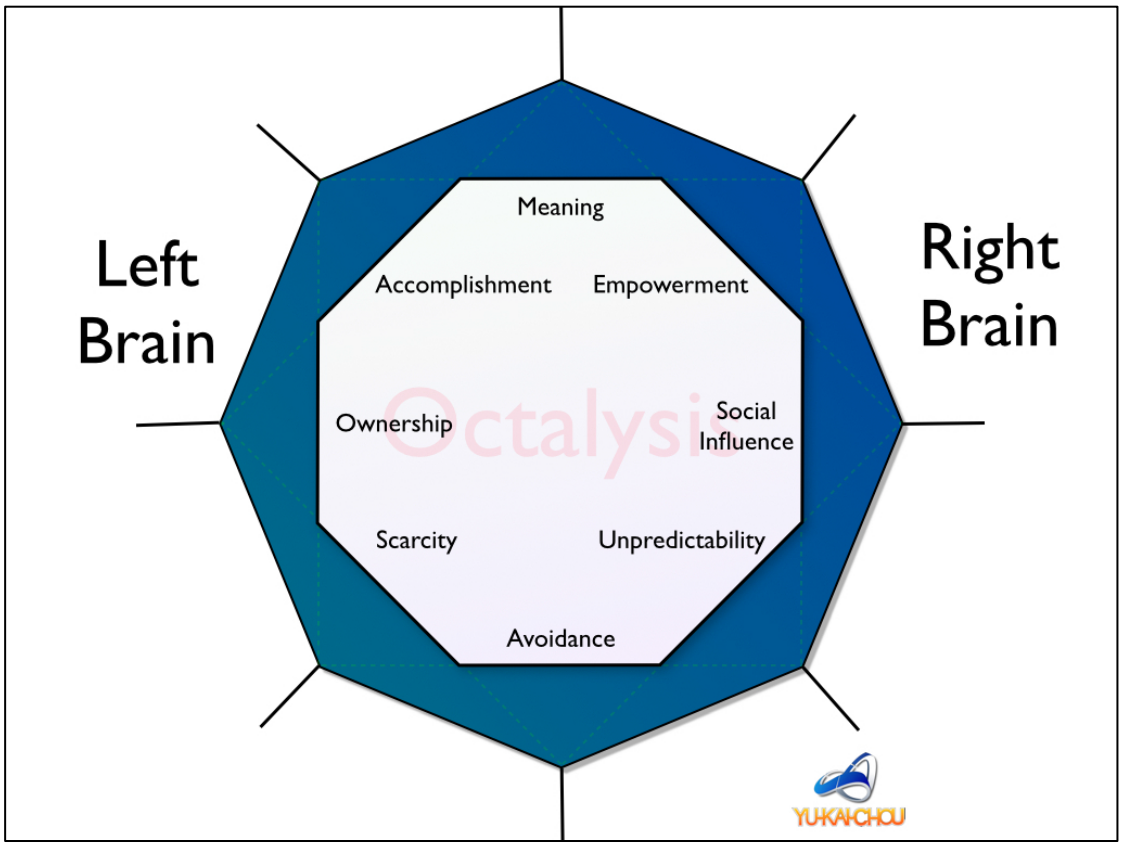

Figure 2.4 Octalysis Gamification Framework – Left-Brain vs Right-Brain

According to Chou (2014), gamification consists of eight core drivers, namely Meaning, Empowerment, Social Influence, Unpredictability, Avoidance, Scarcity, Ownership, and Accomplishment. Brito et al. (2018) have modified this framework and implemented only six elements, with a focus on mobile applications. After considering the studies of Chou (2014) and Brito et al. (2018), together with the current mobile payment circumstances in Malaysia, this study excludes empowerment and scarcity for several reasons.

Empowerment of creativity and feedback in gamification is a core driver that portrays the creative progress consumers are involved in when they attempt to sense new things and make different combinations. Consumers need to convey their creativity, evaluate its results, receive feedback, and adjust accordingly (Chou, 2014). However, professionals in technology adoption theories have stressed that the acceptance of

technology is largely influenced by consumers' perceived ease of use. This concept has been widely investigated (Püschel et al., 2010; Sripalawat et al., 2011), with findings suggesting that services are assumed to improve consumers' lives by offering a trouble-free interface and fast access in setting payments. Since mobile payment is designed with functions that are easy to use, users are less engaged in creative processes when interacting with the application. Hence, the empowerment of creativity and feedback is not selected for this study.

Meanwhile, scarcity and impatience represent the desire of users for something extremely rare, exclusive, and immediately unobtainable. This element is deemed irrelevant in the present context, as users in Malaysia are currently indulged with numerous options for mobile payment. Consequently, mobile payment services have become ubiquitous, rendering scarcity an unsuitable driver to be examined in this study.

Although Chou's Octalysis framework consists of eight core drives, previous studies highlight that the application of all dimensions is not always necessary because the relevance of each motivational driver depends on the research context and users' behavioural objectives. Gellner et al. (2021) emphasized that researchers may selectively apply suitable Octalysis core drives according to the characteristics of the target users and the intended purpose of the gamified system, as different environments may activate different motivational mechanisms. Consistent with this view, Brito et al. (2018) developed and validated an Octalysis-based gamification measurement scale for mobile application users and empirically retained only six dimensions: Meaning, Development, Ownership, Social Influence, Unpredictability, and Avoidance. The dimensions of Empowerment of Creativity and Feedback and Scarcity and Impatience were excluded during the scale validation process due to insufficient empirical support in the measurement model. Therefore, the present study adopts the six validated dimensions proposed by Brito et al. (2018), as they demonstrate stronger measurement relevance and suitability for mobile-based service contexts.

2.6.2 Review of Gamification and Technology Adoption

To enhance understanding regarding the topic, several papers were reviewed. The investigation commenced with a thorough exploration of related articles. Remarkable and established scholarly databases such as Google Scholar and Elsevier's Scopus were utilized for their proven reliability, precision, and comprehensiveness in

assessing the impact of scholarly manuscripts and their authors (Walters, 2009). Employing the funnelling method, numerous articles pertinent to gamification and technology adoption were systematically considered and retrieved. The keyword search encompassed terms such as "gamification", "technology adoption", "technology acceptance", "mobile payment", "gamification and adoption", and "gamified technology adoption".

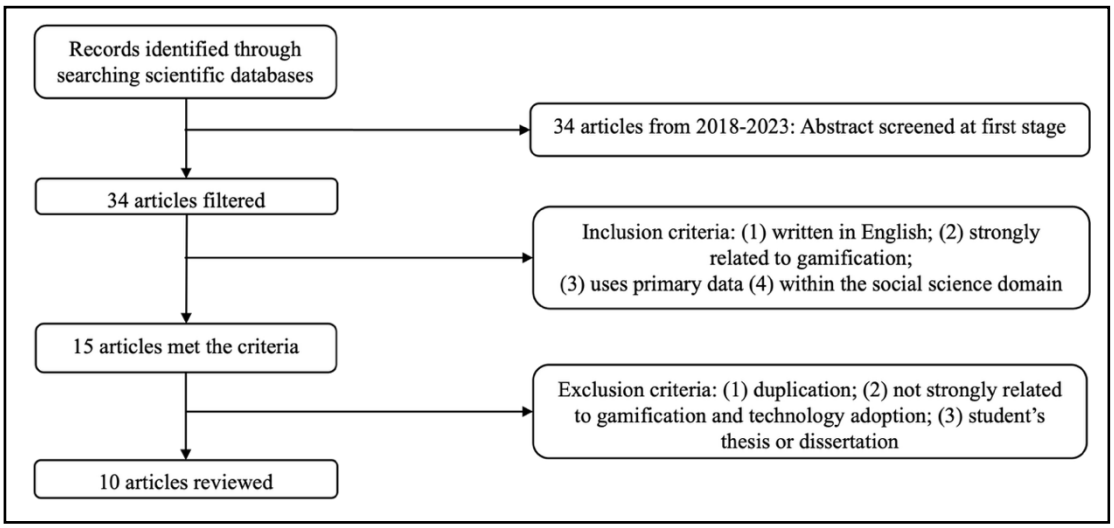

Figure 2.5 The Screening Process for Literature Review on Gamification and Technology Adoption

A three-stage screening process was implemented to identify the most suitable papers for review. At the first stage, the researcher systematically reviewed and analyzed previous literature on gamification, Octalysis gamification, and technology adoption spanning the years 2018 to 2023. The selection of this time frame is based on the assumption of an increased number of published papers that might provide up-to-date insights into gamification and technology adoption. Following the screening of abstracts, 34 relevant papers were gathered.

At the second stage, the papers were further refined based on particular criteria, namely that they should be written in English, strongly related to gamification, complete, and fully accessible. This resulted in the retrieval of 15 articles.

In the final stage, five papers were excluded due to duplication, classification as student theses or dissertations, or a lack of relevance to technology adoption. Consequently, the final review involves the analysis of only ten articles.

Analysis of Results

Based on the results, the studies are dominated by the Chinese context, consisting of three out of the ten reviewed articles, followed by studies from India, Pakistan, Vietnam, Albania, the United States, Nigeria, and Ghana. The studies from China have employed different theories or models in each case. First, Yu and Huang (2022), who conducted a study among mobile commerce shoppers, chose perceived value theory and gamification. Meanwhile, Wong et al. (2022) employed the TAM model, conceptualization of gamification, and prospect theory to study WeChat app usage among Chinese elderly. Next, Yang et al. (2023), focusing on mobile wallet users in China, used the UTAUT2 model and the Octalysis gamification framework.

The interplay between gamification and technology adoption is notable, especially in the context of encouraging users to adopt and engage with new technologies. Gamification strategies are often employed to make the adoption of technology more appealing and user-friendly. By incorporating game-like elements, developers aim to overcome potential barriers to technology adoption, thereby making the learning or adoption process more enjoyable and motivating. Thus, researchers are extending their area of study in technology adoption by applying gamification elements.

The results show that five out of the ten reviewed papers involve mobile payment services acceptance. This is followed by two articles focusing on mobile banking adoption, one article on internet banking adoption, one article on mobile commerce acceptance, and one article on Fitbit app adoption in the health and fitness domain. The summary of the final review of gamification and technology adoption is provided in the next table.

Table 2.4
Summary of Final Review of Gamification and Technology Adoption.

Sources	Country	Context	Model/Theory/ Concept	Predictors	Mediators/ Moderators (if any)	Outcome
Rahi and Ghani (2018)	Pakistan	398 Internet users from five commercial banks	UTAUT model and Gamification	Website design(sig), Website characteristic(sig), General self-confidence(sig)		Customer's performance expectancy
				Website design(sig), Website characteristic(sig)		Customer's effort expectancy
				Website characteristic(sig)		Website design
				Performance expectancy(sig), Effort expectancy(sig), Website design(sig), General self-confidence(sig)		Customer's intention to adopt Internet banking
				Customer's intention to adopt(sig)	Gamification(sig)**	Customer's intention to recommend
Thảo et al. (2018)	Vietnam	In-depth interviews with 10 potential customers who were asked to express their opinions to mobile payment services	UTAUT model and Gamification	Performance expectancy(sig), Effort expectancy(sig), Social influence(ns), Trust(sig), Perceived financial cost(ns), Gamification(sig)		Behavioural intention
Çera et al. (2020)	Albania	380 questionnaires distributed to Generation X and Generation Y	UTAUT 2, Gamification, and Generational cohort theory	Behavioural intention(sig), Facilitating condition(ns), Habit(sig)		User behaviour
				Performance expectancy(sig), Effort expectancy(ns), Social influence(ns), Facilitating condition(sig), Habit(sig), Hedonic motivation(sig), Gamification(ns)	Generation**(sig:GM)	Behavioural intention

Sources	Country	Context	Model/Theory/ Concept	Predictors	Mediators/ Moderators (if any)	Outcome
				Social influence(ns), Facilitating conditions(sig), Habit(sig), Hedonic motivation(sig)		Gamification
				User behaviour(sig)		Intention to recommend
Bitrián et al. (2021)	USA	276 U.S. users of the Fitbit app	Self-system model of motivational development (SSMMD) and Gamification conceptualization of Koivisto and Hamari (2019)	Achievement(sig), Social(ns), Immersion(ns)		Competence
				Achievement(sig), Social(ns), Immersion(ns)		Autonomy
				Achievement(sig), Social(sig), Immersion(sig)		Relatedness
				Achievement, Social, Immersion	Competence*(sig)(sig:AC,SC)(ns:IM), Autonomy*(sig)(sig:AC, SC)(ns:IM), Relatedness*(sig)(sig:AC,SC)(ns:IM)	Engagement
				Achievement, Social, Immersion	Engagement*(sig)(sig:AC,SC)(ns:IM)	Continued use intention
				Achievement, Social, Immersion	Engagement*(sig)(sig:AC,SC)(ns:IM)	WOM intention
				Achievement, Social, Immersion	Engagement*(sig)(sig:AC,SC)(ns:IM)	App rating
Salimon et al. (2021)	Nigeria	388 respondents with previous experience of smartphone banking in Nigeria	TAM model and Gamification	Perceived usefulness(sig), Perceived ease of use(sig), Gamification(ns), Hedonic motivation(sig), Context(sig), Time perception(ns)	Hedonic motivation*(sig: PU, PeoU, GMF)	Smartphone banking usage
				Perceived usefulness(sig), Perceived ease of use(aig), Gamification(sig)		Hedonic motivation

Sources	Country	Context	Model/Theory/ Concept	Predictors	Mediators/ Moderators (if any)	Outcome
Dzandu et al. (2022)	Ghana	567 mobile money service users in Ghana	An integrated Social Impact Theory and Customer Value model with Gamification	Gamified M-payment(sig)		Internalisation
				Gamified M-payment(sig)		Identification
				Gamified M-payment(sig)		Compliance
				Internalisation(ns), Identification(ns), Compliance(sig)		Customer engagement
				Internalisation(sig), Identification(ns), Compliance(sig)		Satisfaction
				Internalisation(ns), Identification(sig), Compliance(sig)		Loyalty
Yu and Huang (2022)	China	1586 mobile commerce shoppers in China	Perceived value theory and Gamification	Utilitarian value(sig), Hedonic value(sig), Social value(sig), Time/effort(sig)		Game use intention
				Utilitarian value(sig), Hedonic value(ns), Social value(sig), Time/effort(ns)	Game use intention* (sig:UV,HV,SV,TE)	Platform purchase intention
Wong et al. (2022)	China	633 consumers aged 50 and over in local communities and colleges for the Chinese elderly (WeChat app users)	TAM model, Conceptualization of gamification, and Prospect theory	Perceived enjoyment(sig)		Perceived effectiveness of gamification
				Perceived effectiveness of gamification(sig), Perceived ease of use(sig)	Perceived usefulness*(sig:PEG, PEOU)	Attitude towards technology adoption
				Attitude towards technology adoption(sig)	Perceived risk**(sig)	Adoption intention
Malik and Singh (2022)	India	798 young consumers who had been using UPI-based mobile payments of service providers like (Paytm, Google pay, PhonePe,	UTAUT 2 model and ISS theory	Performance expectancy(sig), Effort expectancy(ns), Facilitating condition(sig), Social influence(sig), Hedonic Motivation(sig), Price value(sig), Habit(ns),		Behavioural intention

Sources	Country	Context	Model/Theory/ Concept	Predictors	Mediators/ Moderators (if any)	Outcome
		BHIM, and Amazon pay).		Information quality(sig), System quality(sig)		
				Behavioural intention(sig)	Gamified features*(sig)	The use of M-payment
				The use of M-payment(ns)	Trust**(sig)	Continuance use of M-payment
Yang et al. (2023)	China	231 mobile wallet users with different education level, income and working background, with the age group of 18 to 36 years-old in China via online questionnaires.	UTAUT 2 model and Octalysis gamification	Performance expectancy, Effort expectancy, Facilitating Condition, Social influence, Hedonic motivation, Perceived value, Habit, Avoidance, ownership		Behavioural intention

Note: *=mediator, **=moderator, sig=significant, ns=not significant

2.7 Meaning

What people do, what people pursue, in some way or the other is mainly to chase pleasure. Pleasure brings happiness; it makes us feel excited just by waiting for the desired outcome. But sometimes human beings are more than the pursuit of 'pleasure'. Somehow, they need a sense that they are in something bigger in a positive way that can enhance their quality of life. Usually, it involves motivation, productivity, mission, or vision. It is called epic meaning and calling.

'Epic meaning and calling' is the first driver in gamification by Chou (2014). This element demonstrates that the action people take is perceived as a deed for the greater good. As quoted from the book 'The Courage to be Disliked', making some contributions towards society can raise people's key sources of joy. An example given by Chou (2014) is Wikipedia. Over the years, the information on Wikipedia has been updated tremendously by people who are unknown to the reader without receiving any payment. Other examples may include when people help to clear public trash cans for everyone's satisfaction and comfort, or when they purchase air-conditioning and refrigerators that have no HCFCs to limit global warming and fight ozone layer depletion. In addition, certain games begin with a backdrop or story and require the player to save the world, such as Jumanji, or save a princess, such as Super Mario. Sometimes, epic meaning is insufficient; people want to feel that they possess some 'special power' that others do not have. This 'special power' helps people to 'save the world'. This is where 'beginner's luck' comes into play, an effect that makes people think they are gifted with talents that others lack, enabling them to execute the task at hand.

In terms of video games, epic meaning and calling is where the plot of a game often involves missions that make the player feel greater, such as saving a mythical universe. The progress regularly made by the player to achieve the grand mission is the main reason games are so fun and engaging (Spacey, 2023). Meanwhile, in non-game fields, Chou (2014) defined epic meaning and calling as an element that takes effect when an individual sees that he or she is doing something better than themselves and/or was selected to perform that action. Furthermore, Brito et al. (2018) indicated that epic meaning and calling is related to situations where people put significant goals into effect, believing they are making contributions greater than themselves or that they were

chosen to do something good. Hence, the definition of meaning (epic meaning and calling) for this study is that the user believes he or she is doing something significant when conducting payment transactions by continuing to use the mobile payment application.

According to Brito et al. (2018), purpose can replace epic meaning and calling as a driver in gamification because both are related. Purpose is also related to the accomplishment of a significant priority where individuals believe they are contributing something greater. By creating a sense of purpose when users engage with an application, the application can enhance and generate more engagement. Moreover, the combination of user goals and the altruistic criterion of human nature is the major idea of epic meaning and calling (Kanov et al., 2004). As we know, selflessness, concern for others, feeling good after helping someone, or prioritizing the well-being of people around them, whether they have personal relationships or not, are characteristics of altruism. A behavioural path is formed by combining these traits and the user's aim, which eventually becomes a reward or an honour for the user through actions that benefit the entire community (Zichermann & Cunningham, 2011).

In the mobile payment domain, epic meaning and calling play a role when users develop the feeling to use mobile payment because they think it will aid economic growth in Malaysia. Mobile payment users who emphasize this element consider conducting cashless payments as more than just performing transactions. They believe they are also helping business development, especially small and medium enterprises. Mobile payment helps to boost new transactions, increase brand awareness, and acquire new customers. Thus, by using the application, users contribute to business development as well as economic growth. Malaysia has noticed the benefits of adopting e-wallets/digital wallets, as a cashless society helps the economy of the country by up to 1 percent in savings. This is possible when e-wallet adoption leads to lower retail payment costs and reduced cash transactions. Economies that are more cash-oriented tend to experience slower proliferation and do not receive significant financial advantages. In contrast, economies that embrace digital financial ecosystems are more successful, as shown by BCG research, with an increase in annual GDP of up to three percentage points (Massi et al., 2019).

To further support the sprouting of a cashless economy, the Malaysian government and mobile payment providers offer incentives for merchants and consumers. The incentives include cash rebates, points, badges, reduction of

transactional rates, governmental grants to switch to digital financial ecosystems, and many more. These are good examples of gamified tools that can provide advantages to the community. Such gamified tools are considered rewards and are sometimes partnered with charitable donations or corporate sustainability efforts. Moreover, by incorporating mobile payment, non-profits can expand their donor base, improve conversion rates, and boost fundraising efforts. Mobile payments provide convenience in transactions, allowing donors to donate anytime and anywhere, thereby driving a more effective and efficient donation process.

Mobile payment providers must design a 'tale' of epic proportions that compels users to complete the exploration of the app. The in-app interactions and meaningful impressions in reality should be linked in order to make users care about the provider's cause. Finally, the applications must include a system of epic rewards to attract new users and retain current ones, ensuring loyalty to the service over time. Initially, mobile payment applications were created to remove hurdles and finalize consumer purchases easily. Consumers are now able to make transactions simply by scanning QR codes, tapping credit cards at POS terminals, or making online transfers using the app. These innovations help move the economy progressively toward forming a cashless society. One of the biggest benefits was evident during the outbreak of Covid-19. In this circumstance, epic meaning and calling came into play when users chose to keep using mobile payment applications to help the whole community fight the Covid-19 virus. Since social distancing practices were implemented, most people shopped online to avoid cash transactions and reduce interactions. QR-code scanning became the best payment method for them, as it provides both proximity and remote payment.

H1a: Meaning significantly influences attitude toward M-payment among Malaysian users

H1b: Meaning significantly influences perceived enjoyment among Malaysian users

2.8 Development

Human being is a mortal that will always ask for more. From a negative perspective, this can be called greed. But from a positive viewpoint, it is development. People with goals commonly stay progressive to promote their personal growth. This progress forces individuals to move out of their comfort zone and helps to boost self-

awareness, confidence, and strength. After the outbreak of Covid-19, at the peak of the pandemic, people started to feel changes with the new life routine. One of these new routines was the transition from purchases with cash to cashless transactions. Since life in a cashless society has more benefits, it is therefore considered as a positive development that happened among Malaysian users.

In general, development is a series of actions taken to generate progress, growth, or positive changes towards individual, social, physical, economic, environmental, and demographic components. Development is important as it emphasizes the enhancement of the level of life in a population. Furthermore, it can help to expand local income, employment opportunities, and the quality of social life without harming environmental resources. These changes result in positive development in both society and economy. When this development happens, the well-being of every individual in society will be improved until they reach their full potential and accomplish their goals.

In the gamification view, development is linked to accomplishment. In the octalysis gamification framework, development and accomplishment is the second element out of eight drivers. It is an internal driver for skill development, progress advancement, achieving mastery, and surpassing challenges. These sensations are usually followed by a reward of joy and accomplishment (Brito et al., 2018). The meaning of 'challenge' here is crucial, as the reward and feeling of accomplishment have no meaning without obstacles in gaining it (Chou, 2014). In this study, development (development and accomplishment) is defined as an internal motivator for users in making progress in their life by switching from using cash as a payment method to employing mobile payment applications to purchase goods/services and continue usage after the trial.

'Development and accomplishment' is the most frequently employed element in gamification studies. Points, badges, leaderboards, and progress bars are commonly used techniques for this driver (Brito et al., 2018). These techniques act as rewards that can be obtained by users when conducting transactions through mobile payment applications. The rewards may be limited at certain levels, but scores usually do not have a maximum limit, allowing users to raise their scores freely every time they use the application to perform activities. For example, in the Shopee platform, every time consumers make purchases at certain stores, they are rewarded with points in the form of coins under two conditions: (1) consumers must own eligible vouchers; and (2) consumers must use ShopeePay wallet to make payments.

In addition, to ensure user engagement, Shopee platform also provides users with several games to retrieve coins, where the number of coins is determined by the degree of the game. A game player commonly starts with very easy levels and then moves up to harder levels. This system is deliberately created to ensure the engagement of players with the game continues (Medler, 2011). Sailer et al. (2013) stated that the human brain is naturally attracted to feelings of growth, progress, and rising numbers. Indicators such as rising numbers and performance give people additional aims, which lead to friendly rivalry and competition between users (Montola et al., 2009).

It is predicted that there will be more than one billion mobile payment activities made by users worldwide in 2023, an increase from 950 million in 2019 when the pandemic had just started (Damen, 2022). The increase in mobile payment activities occurred due to several benefits. Among these benefits, some can help users in making progress in their lives. First, cash flow is improved. As long as a mobile device is at hand, the transfer of funds between two parties can be executed easily either instantly or within 2–3 days. In addition, the transactions are also recorded in the applications. Second, convenience in purchases is promoted. With this benefit, users can make payments and complete their daily routines at a faster pace without wasting time calculating cash before paying. Third, better payment security. This is one of the best examples of positive change in mobile payment users, as all consumer personal data is protected by an encrypted code. Users do not have to remember all the data because the real number of cards will be saved but never stored in the app's system. Thus, the risk is lower when security is increased.

Not only that, findings also suggest that the adoption of mobile payment among older users, such as baby boomers and Generation X, has brought new perspectives. When they see the progress they can make with mobile payment, they try the app, gradually become accustomed to it (surpassing challenges), and eventually continue to use mobile payment (Santosa et al., 2021). Clearly, these benefits help users promote their development, which leads to satisfaction that is captured as the overall service experience over time (Wixom et al., 2005). A consumer with satisfaction has a tendency to reinforce ties with the service provider by continuing to seek their services (Amin et al., 2023). This is because satisfaction positively impacts users' continuance intention (Santosa et al., 2021).

H2a: Development significantly influences attitude toward M-payment among Malaysian users

H2b: Development significantly influences perceived enjoyment among Malaysian users.

2.9 Ownership

When we buy a pen, we own it. When we buy a house, we own it. Even when we buy a building with debt, we still own the building, because we have ownership over these things. Ownership is a circumstance where people possess something, and this possession provides them with the quality of control. The concept of ownership involves the legal right to use, possess, and dispose of anything. It also means individuals may possess tangible things such as a house, car, and land, or intangible things such as intellectual property rights, emotions, and friendships. Owning something brings feelings of confidence, joy, and accomplishment, especially when it is hard to achieve.

While many expect ownership to trigger greed, it actually helps to generate goodness in people. A study has suggested that when people love their possessions, it is a form of self-care, as the attachment to what they own leads them to see those possessions as an "extension" of themselves. This connection can drive individuals to develop behaviour that reflects sincerity and responsibility in managing what they own. Moreover, ownership has the capability to enhance individual self-esteem, which in turn leads to the enhancement of prosocial behaviour (Jami et al., 2020).

'Ownership and possession' is the fourth element after empowerment of creativity and feedback in the Octalysis framework. This element is related to the motivation that users experience because of the feeling of owning and controlling something (Chou, 2014). When people perceive ownership of something, they are motivated to improve and enhance it. Ownership and possession directly affect the desire to acquire and accumulate wealth, and it is also related to many virtual goods or virtual currencies (Brito et al., 2018). The ownership of virtual items, from a sociological perspective, was studied by Lehdonvirta et al. (2009), who found that virtual products are often used to demonstrate differences between individuals.

Ownership can be defined as a situation where people perceive that the target is "theirs" (Pierce et al., 2003). From an organizational context, ownership can be generated for targets such as the work itself, a task, a tool, or the organization (Dyne &

Pierce, 2004). In the technological aspect, ownership emerges when individuals develop a feeling of possessing information technology or information systems (Barki et al., 2008). If ownership is defined in the virtual world, it is a phenomenon experienced by individuals, where the feeling of possession occurs in a digital environment (Lee & Chen, 2011). Meanwhile, Klesel and Ndicu (2016) illustrated ownership as a sense of possessiveness and attachment to an object, which influences technology usage and acceptance. In addition, the founder of the Octalysis gamification framework, Chou (2014), indicated that ownership occurs when users perceive control over a project, process, or organization. Thus, the definition of ownership can be accepted as the motivation to use a technology because users feel they possess and control it. Therefore, this study defines ownership as the state in which users are motivated to use mobile payment methods because they feel that they own and control the application.

Compared to meaning and social influence in the Octalysis framework, ownership is not widely employed in many contexts together with other predictors. However, ownership can still manifest itself in a variety of areas. Ownership behaviour and motives have attracted interest and have been observed in several fields such as politics, history, economics, law, and philosophy (Ching, 2019). Everyone ensures that the things they own are nurtured and enhanced, while also striving to keep them safe. The sense of ownership can encourage accountability, obligation, responsibility, and a greater willingness to take risks (Pierce et al., 2003).

Although ownership has previously been scarcely discussed, it is now becoming increasingly relevant in human–technology studies (Klesel et al., 2016). Several areas have applied the concept of ownership, including information systems (Barki et al., 2008), workplace devices (Klesel et al., 2016), social media (Karahanna et al., 2015), virtual worlds (Lee & Chen, 2011), and online education (Buchem, Tur, & Hölterhof, 2014). This is likely due to its potential in influencing human behaviour and motivation. For this reason, the ownership driver is conceptualized as the feeling of possessiveness towards a certain technology (Barki et al., 2008). Furthermore, ownership has been found to influence and relate to ease of use, perceived usefulness, attitude, and intention to use technology (Barki et al., 2008; Lee & Chen, 2011; Karahanna, Xu, & Zhang, 2015).

According to Ching (2019), studies have demonstrated that ownership impacts the link between a variety of user-related factors and user behaviour. There is a significant relationship between user experiences and beliefs, which provides deeper

insights into the activation of consumers' continuous behaviour towards technology. Moreover, continuance intention is described as the process by which the relationship between users and technology is strengthened, leading users to perceive the technology as part of themselves rather than merely a tool or device. These ideas suggest that ownership can be applied to continuance intention and in the wider context of technology acceptance. In addition, this driver can explain how users relate themselves to a technology until it becomes an extension of their identity.

H3a: Ownership significantly influences attitude toward M-payment among Malaysian users

H3b: Ownership significantly influences perceived enjoyment among Malaysian users

2.10 Social Influence

Social influence commonly involves the connection between the people surrounding us, particularly the relationships with peers. At certain times, we seek recommendations from others to make decisions in life. Good influence is more likely to generate positive impacts on individuals. Social influence can occur in two states: voluntary and mandatory. Individuals have the tendency to react or act in ways that have been approved by others after considering their opinions. This reflects how people perceive that their environment is under control. The opinions of others hold enormous value because we are concerned about what people say and think of us, as we are naturally social beings. This is the primary reason why individuals are easily swayed by the perspectives of others. Social influence is normally associated with 'word of mouth'. Previous research has suggested that word of mouth is a strong predictor that provides people with valuable information to guide their usage decisions (Lim et al., 2006). This may be because social influence is more powerful when information exchange occurs between people who are closely connected (Reychav et al., 2015).

In the Octalysis framework, 'social influence and relatedness' is identified as the fifth construct out of eight. It encompasses social factors such as envy, competitive behaviour, acceptance by others, companionship, mentorship, and the desire to feel included. People rely on these social factors when acting, while also considering what others think, do, or say (Brito et al., 2018). When individuals form connections with people, events, or places, they will naturally attach themselves to them. For instance,

when people listen to nostalgic songs, they are more likely to download them from online platforms. Similarly, people acquire important sources of knowledge or information by comparing themselves with others (Wood, 1989). In the gamification context, social influence can be observed when users score points and are ranked based on their performance. The performance of both the user and other players is displayed (Vorderer et al., 2003), which motivates users to accumulate more points in order to move up the ranking system.

The founder of the UTAUT model, Venkatesh et al. (2003), defined social influence as the degree to which individuals perceive that important others believe they should use a system. Similarly, social influence can be understood as a state where a user feels that influential individuals view technology usage as vital (Diaz & Loraas, 2010). Ghalandari (2012) defined social influence as the extent to which individuals decide to use a technology if they perceive that well-connected others are already using it and encourage them to adopt it. Meanwhile, the founder of the Octalysis gamification framework, Chou (2014), explained that 'social influence and relatedness' is a driver that consists of several social elements such as social acceptance, mentorship, competition, companionship, envy, and social feedback, all of which are capable of motivating individuals to act. Hence, this study defines social influence (social influence and relatedness) as a factor that motivates users to continue using mobile payment applications after considering the opinions of influential others in their decision-making process.

Reychav et al. (2015) proposed that individuals tend to consider the opinions of those close to them, such as family and friends, before making purchasing decisions. For example, Tan et al. (2017) found that Malaysian consumers acknowledged the influence of others before purchasing tourism products using mobile applications. Based on prior research, consumer intention can be affected by social influence in both voluntary and mandatory contexts. In voluntary contexts, individuals use technology because of a personal desire to maintain a good image or to gain higher social status within their circle. In contrast, in mandatory contexts, social influence affects users when they choose to adopt or reject a technology in order to gain social rewards or avoid punishment (Venkatesh & Davis, 2000).

Social influence has long been incorporated into various technology adoption theories and models, such as UTAUT, UTAUT2, TRA, TPB, the MPCU model, and DOI theory. Although these frameworks may use different terms, the concept of social

influence whether direct or indirect is essentially the same. Indirect influence involves normative pressure, where users adopt technology based on the perspectives of their social group and the shared social meaning of usage. Direct influence, in contrast, suggests that users adopt technology because of their belief about how others perceive them as a result of using it (Venkatesh et al., 2012). Social influence in gamification reflects a similar concept. Despite contextual variations, all models and theories agree that social influence is a strong and direct predictor of usage intention, which subsequently leads to adoption behaviour and continuance of use after the first trial (Celik, 2016).

The relationship between social influence and continuance intention has been investigated extensively across different domains. Lin et al. (2014) suggested that continuance intention to use the Facebook app among consumers is strongly impacted by social influence. Likewise, social networking site (SNS) users are more likely to continue using these platforms when influenced by factors such as perceived critical mass, privacy concerns, gratification, and subjective norms (social influence) (Ku et al., 2013). Similarly, continuance intention has been explained by several antecedents, including social influence (Sun et al., 2014). Mouakket (2020) further revealed that factors such as satisfaction, enjoyment, perceived usefulness, habit, and social influence collectively explained more than 50 percent of the variance in continuance intention.

Another study by Chang et al. (2017) investigating the continuance intention to use Facebook and LinkedIn found that social influence is a strong and positive predictor. In electronic payment research, Indrawati et al. (2012) demonstrated that social influence has a positive and significant effect on continuance intention. Likewise, social influence directly affects continuance intention in the use of crowdsourcing games (Wang et al., 2019). A study by Sok and Chan (2011) revealed that users in Kuala Lumpur, Malaysia, shape their beliefs based on the social environment around them, with social influence emerging as the strongest predictor of usage intention. Similarly, Yu (2012), who studied technology adoption in Asian countries, proposed that social influence exerts the most powerful impact on users' intention to adopt technology. Although some of these studies were conducted over a decade ago, they highlight that Asian societies emphasize others' opinions before acting, owing to cultural norms that prioritize collective perspectives.

Several studies have also found that gamification services (Li et al., 2021) and socialization services, particularly virtual communities (Vanduhe et al., 2020), can spark

consumer continuance intention. At present, social influence has become an increasingly popular predictor of continuance intention, particularly in gamification settings. The role of social influence is deemed imperative (Vanduhe et al., 2020), with its significance in gamification research receiving growing attention (Chew & Leng, 2014). The integration of social influence with technology-based approaches especially those leveraging psychological phenomena has further demonstrated its effectiveness in driving user behaviour toward favourable outcomes such as health, sustainability, and other positive behaviours (Li et al., 2022).

H4a: Social influence significantly influences attitude toward M-payment among Malaysian users

H4b: Social influence significantly influences perceived enjoyment among Malaysian users

2.11 Unpredictability

The rapid proliferation of technology may appear advantageous, yet it also has its limitations. Predicting technology adoption is particularly complex because technological diffusion occurs under the influence of multiple factors, many of which are unpredictable compared to those assessed in industrial laboratories. Specifically, these unpredictable factors are often social in nature, making them more challenging to anticipate than purely technological ones. However, unpredictability can also stimulate curiosity, motivating users to conduct further exploration and research about a technology, thereby enhancing their understanding before adopting it.

Within the Octalysis gamification framework, unpredictability and curiosity constitute the seventh element. This driver encompasses techniques that stimulate consumers' desire to anticipate forthcoming outcomes (Zichermann & Cunningham, 2011). It is activated when users encounter unfamiliar situations that disrupt their usual pattern recognition cycle, thereby capturing their attention (Chou, 2014). The element of unpredictability is closely intertwined with curiosity, as gamification often leverages curiosity by incorporating activities that deliver surprise rewards, thus encouraging users to believe they may gain benefits at any moment through their actions (Hidi et al., 2004). This dynamic explains why unpredictability is a major factor contributing to gambling addictions (Chou, 2014).

Unpredictability is widely recognized as a powerful determinant of user engagement, prompting individuals to persist in their search for clarification of the unknown (Abdul-Jabbar, 2021). It can be defined as a continuous state of engagement arising from the user's curiosity about forthcoming outcomes (Chou, 2014). Furthermore, unpredictability stimulates the brain's reward center, as people are naturally drawn to uncertain situations (Abdul-Jabbar, 2021). In the context of this study, unpredictability (unpredictability and curiosity) is therefore defined as a condition in which users remain engaged with mobile payment applications due to their curiosity about what may occur next if they continue using the system.

Previous studies on technology adoption have often associated unpredictability with uncertainty, risk perception, or trust issues. For instance, Sugandini et al. (2018) found that technology adoption is significantly influenced by uncertainty, whereby communities refrain from using technology if they perceive high levels of ambiguity. In terms of risk perception, Ramtiyal et al. (2022) demonstrated that perceived risk negatively influences user intention, as risks diminish consumer willingness to engage with sharing economy services. Similarly, Zhang et al. (2019) revealed that perceived risks or potential losses discourage continuance in mobile payment usage. Conversely, Chang et al. (2022) highlighted that trust in mobile payment services fosters sustained use, consistent with findings that trust in security strongly predicts adoption willingness (Xin et al., 2015). Collectively, these studies indicate that uncertainty, risk perception, and trust are significant predictors, though they exert a negative influence on continuance intention.

By contrast, this study emphasizes the positive role of curiosity within unpredictability, rather than focusing on uncertainty or risk. Curiosity functions through two mechanisms: first, by reducing uncertainty and alleviating the discomfort associated with informational loss, and second, by driving information-seeking to generate interest and positive emotions (Fang et al., 2021). This aligns with Keller et al. (1994), who argued that motivational systems encompass both pleasurable and unpleasant experiences. For instance, hunger may be triggered by appealing sensory stimuli such as sight or smell, as well as by nutritional deficiency.

Users tend to become curious in information system technologies when they are deeply engaged in activities. Unpredictability is thus heightened when users perceive situations as fun or interesting. Furthermore, novelty constitutes a crucial element of intrinsic motivation. Key drivers that motivate users to explore information systems

often stem more from curiosity than from pre-existing interest, facilitated by the abundance of available resources and information (Chang et al., 2013). These ideas suggest that unpredictability can significantly influence users' continuance intention to adopt mobile payments when they are engaged in transactions and perceive the application as enjoyable. For example, a user who adopts mobile payment for purchases may discover that the application provides rewards. Upon finding these rewards appealing, unpredictability and curiosity are stimulated, leading the user to continue employing the system in anticipation of future benefits.

H5a: Unpredictability significantly influences attitude toward M-payment among Malaysian users

H5b: Unpredictability significantly influences perceived enjoyment among Malaysian users

2.12 Avoidance

In psychology and applied behavioral sciences, it is widely acknowledged that the impact of loss is greater than the impact of equivalent gains. Consequently, individuals are more inclined to avoid negative outcomes in order to prevent losses. Loss often provokes despair, anger, frustration, numbness, shock, or profound sadness. Avoidance and loss are generally associated with negative behaviors. However, in this study, avoidance is conceptualized positively, as it fosters continuance intention to use mobile payment among Malaysian users. This is because the potential losses from not using the application are greater than any perceived drawbacks of continued use.

Within the Octalysis gamification framework, loss and avoidance is identified as the eighth and final core driver. Chou (2014) places this driver within the "Black Hat" category of gamification, as it is linked to negative emotions and psychological manipulation. Users typically disengage when they experience frustration arising from a lack of control over technology. Nevertheless, these negative emotions are not entirely detrimental, as they may still serve as strong motivational factors. Owing to its deep connections with psychological mechanisms, this driver can yield valuable insights when studied appropriately (Chou, 2014).

This driver can manifest on both small and large scales. On a small scale, avoidance occurs when users modify or replace previous behaviors to prevent losses. On a larger scale, users may abandon a technology altogether to avoid recognizing prior

efforts as wasted. Excessive reliance on avoidance can also produce missed opportunities (Chou, 2014). Kahneman and Tversky (1979) suggested that individuals are more motivated by potential losses than by equivalent gains, a concept further supported by Ariely et al. (2005), who explained that people will go to great lengths to prevent losses even when the chances are minimal. Chou (2014) similarly defined avoidance as motivation to prevent unfavorable outcomes. Accordingly, this study conceptualizes avoidance (loss and avoidance) as the motivation to continue using mobile payment methods in order to avoid the losses incurred by not employing them in transactions.

Brito et al. (2018) linked avoidance to loss aversion theory. As Kahneman (2011) emphasized, loss aversion has significant implications in psychology and behavioral economics. Although gains and losses of equal value are objectively equivalent, individuals perceive losses as having a disproportionately greater impact (Gal & Rucker, 2018). As such, individuals prioritize avoiding losses over achieving gains (Thaler, 2000). In decision-making contexts, losses exert stronger influence than gains, with preferences shaped by reference points (Gal & Rucker, 2018). This underscores the double weight of losses compared to equivalent wins, making loss aversion a critical factor influencing adoption behavior.

In this study, the "losses" from not using mobile payments include missing out on key benefits. First, users forgo price value offered by applications, defined within perceived value frameworks as benefits outweighing costs (Venkatesh et al., 2012; Gan, 2019). Mobile payment providers frequently offer incentives such as cashback, loyalty points, and discounts benefits unavailable in cash-based transactions. These rewards strengthen the relationship between users and providers, reinforcing usage continuity (Gan, 2019).

Second, security and cost-saving advantages are also forfeited if users reject mobile payments. By eliminating the need to carry cash or cards, risks of theft or loss are reduced. Furthermore, mobile payment systems are equipped with multiple layers of security, such as biometric authentication and tokenization, which protect sensitive user information during transactions (Jason & Arthur, 2020). Compared to traditional methods, mobile payments are thus more secure and efficient, minimizing fraud risks.

Avoidance has rarely been examined from a positive perspective in mobile payment research. Similar to unpredictability, it is typically linked with risk perception, uncertainty, and lack of trust. However, in the post-pandemic (endemic) context, mobile

payment technologies have significantly advanced, particularly in terms of features, functionality, and security. QR code payments, for instance, are faster and more convenient than cash or card transactions, often completed within seconds (Gundaniya, 2020). Such ease of use enhances users' perceived control, thereby encouraging adoption. Based on these observations, avoidance exerts a positive influence on continuance intention. Given the numerous advantages of mobile payments, consumers have strong motivation to continue using them rather than reverting to traditional methods. Therefore,

H6a: Avoidance significantly influences attitude toward M-payment among Malaysian users

H6b: Avoidance significantly influences perceived enjoyment among Malaysian users

2.13 Attitude Towards M-payment

The reason why attitudes are crucial is because they often determine consumer behaviour. For example, if an individual shows a more favourable attitude towards mobile payment than credit cards, it is natural to anticipate that the person will use mobile payment methods when making purchases. Apparently, there are four functions that create attitudes, namely the ego-defensive function, the knowledge function, the value-expressive function, and the utilitarian function (Grewal et al., 1998). Normally, these four functions are able to influence attitudes, but even a single function is already sufficient to create an impact on attitudes (Hawkins et al., 2004).

2.13.1 The Relationship Between Attitude Towards M-payment and M-payment Continuance Intention

Attitude is one of the popular topics in the consumer behaviour domain and has been defined by many scholars in different previous works. For example, Allport (1935) defined attitude as a mental condition of willingness, collected through experiences, influencing people's reactions to things and circumstances to which it is connected. Next, attitudes can be referred to as knowledge and a person's feelings, whether positive or negative, and how these feelings affect things or activities (Dibb et al., 1991). Similarly, Solomon et al. (2010) proposed attitude as the overall assessment that describes the extent of people's preferences toward an object, individual, issues, or

activities. Meanwhile, Hawkins et al. (2004) stated that attitude has a wide range of definitions and regarded it as the collection of emotion, perception, motivation, and cognitive activities concerning some perspective of the environment. Later, Pickens (2005) viewed attitude as an individual's tendency to perform actions in a certain way due to their own personality and experience.

In recent years, Critcher et al. (2025) defined attitude as a person's tendency and feeling towards something, whereby it acts as the standard of behaviour and is shaped right before the behaviour emerges. Attitude is the tendency to learn and assess things in a particular way, which involves the assessment of persons, objects, events, or issues. This assessment is either positive or negative and, at certain times, uncertain (Cherry, 2023b). In the mobile payment context, Sari et al. (2022) considered attitude as the attitude towards mobile payment, which acts as the indicator of consumer behaviour in employing mobile payment. Therefore, this study refers to attitude towards M-payment as the user's tendency and feeling towards mobile payment usage that act as the indicator of the continuance intention to use the application.

According to Cherry (2023b), subjective attitudes and norms in a user will help the adoption of mobile payment. This aligns with what has been proposed in the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB), in which users' attitudes drive their intention to accept an innovation. Most of the technology acceptance models and theories, such as TPB, TRA, TAM, or UTAUT, proposed that attitude is a crucial predictor that gives a significant effect on users' behavioural intention (Ajzen, 1975, 1991; Davis et al., 1989; Venkatesh et al., 2012). Additionally, Lin (2011) and Deb and David (2014) supported the relationship between attitude and usage intention. In a mobile banking study, Foroughi et al. (2019) verified that continuance usage intention is significantly affected by users' attitudes. Moreover, the positive intention to accept mobile payment is contributed by the favourable user attitude towards it (Chawla & Joshi, 2020). Istijanto and Handoko (2022) also found that there is a positive relationship between favourable attitudes toward mobile payment and continuance usage.

Based on the information provided, if people have a positive attitude towards mobile payment (M-payment), it is likely that they will continue to adopt and use it. The positive intention to accept and the favourable attitude contribute to a higher likelihood of users continuing to use M-payment, as suggested by Chawla and Joshi

(2020) and Istijanto and Handoko (2022). Positive attitudes may lead to a sustained preference for, and ongoing engagement with, mobile payment applications or services.

H7: Attitude significantly influences M-payment continuance intention among Malaysian users.

2.13.2 The Relationship Between Attitude Towards M-payment, Gamification, and M-payment Continuance Intention

According to Okafor (2023), positive thinking and mindset are the start of a favourable attitude towards something. This kind of attitude helps people to stay optimistic, which in turn brings happiness, success, opportunities, and favourable outcomes that they want for themselves and others. A favourable attitude towards mobile payment allows users to think positively about it, whereby they will have the tendency to make more advantageous decisions regarding the application for themselves and others. It shows that a favourable attitude helps users develop the intention to use mobile payment to make beneficial choices, not just for themselves but also for others. – (Meaning)

Furthermore, researchers have affirmed that a person with a favourable attitude is more productive, as they positively develop themselves to approach new tasks. This leads to the enhancement of self-confidence and success (Okafor, 2023). Users who have a favourable attitude towards mobile payment will believe that using the application helps their routine of payment services to be more effective and efficient. In addition, they feel that the contactless service will also help them to perform economic activities smoothly (Himel et al., 2021). This means that users with a favourable attitude will see that by employing mobile payment, they are making progress in their lives, which in turn enhances their continuance intention towards the service. – (Development)

Next, emotional value is influenced by attitude, as it is the utility that comes from the feelings derived from goods or services (Hsu & Lin, 2014). In many fields of study, whether from science, anthropology, neuroscience, evolutionary psychology, or consumer behaviour, the relationship between individuals' emotional value and their belongings and possessions has been confirmed. This provides comfort and boosts their confidence in their abilities. People's feelings of possession of something make them feel secure and see their belongings as an extension of themselves (Russo, 2018). Users'

favourable attitude stimulates the emotional value in their sense of possession towards mobile payment, which leads to their continuance intention to use mobile payment services. – (Ownership)

Besides, the attitude towards mobile payment is formed after the individual assesses the usage of the application. This attitude is combined with normative belief, which consists of the perception of social pressure to accept or not accept mobile payment. This later leaves an impact on the individual's intention to use it (Chuah et al., 2024). Furthermore, when people associate with others, they will share their opinions and consider others' views as well. Thus, when they favour mobile payment usage, users indirectly lead others to behave like them (Briliana et al., 2019). As stated by Sari et al. (2022), users' attitude towards mobile payment and the opinions of others that they listen to influence their intention to use the application. This means that a favourable attitude towards mobile payment makes users consider others' opinions in their intention to use it. – (Social influence)

When people have a favourable attitude towards something, they become more open-minded, easily receive new information, and enjoy trying new things. This attitude is good for reducing uncertainty and increasing confidence (Okafor, 2023). The confidence gained by users in a system drives them to continue using the application. Searching for the potential to shape confidence by capitalizing on users' information will enhance consumer intention (Abu Bakar et al., 2022). Users who have favourable attitudes towards mobile payment will have high curiosity about the application. This is because they are receptive to new information about mobile payment, and uncertainty is reduced by the positive attitude. Eventually, this helps them to keep using the M-payment application. – (Unpredictability)

Normally, mobile payment applications include important information such as the name of the payer and receiver, the date, and the place of transactions. These applications also give users access to their records. These benefits lead users to form a favourable attitude (Himel et al., 2021). Moreover, convenience also exists in mobile payment usage, as it is flexible in respect of time and place (Bezhovski, 2016). The feeling of convenience helps users to shape their positive attitude towards mobile payment (Park et al., 2019). The advantages offered by mobile payment will create a favourable attitude towards the application, which subsequently motivates users to continue using mobile payment to avoid losing the benefits. – (Avoidance).

H8a: Attitude towards mobile payment mediates the relationship between meaning and M-payment continuance intention.

H8b: Attitude towards mobile payment mediates the relationship between development and M-payment continuance intention.

H8c: Attitude towards mobile payment mediates the relationship between ownership and M-payment continuance intention.

H8d: Attitude towards mobile payment mediates the relationship between social influence and M-payment continuance intention.

H8e: Attitude towards mobile payment mediates the relationship between unpredictability and M-payment continuance intention.

H8f: Attitude towards mobile payment mediates the relationship between avoidance and M-payment continuance intention.

2.14 Perceived Enjoyment

Perceived enjoyment is considered a basic intrinsic motivation that describes the degree to which something enjoyable can be gained from employing IT or an IS. Perceived enjoyment influences the performance of any activity that is not related to any external reason aside from the process of carrying out the activity itself, suggesting that perceived enjoyment is similar to intrinsic motivation (Davis et al., 1992). Compared to traditional settings, game-based settings are more strongly linked to intrinsic motivation, such as enjoyment (Teo & Noyes, 2011).

In the context of mobile payments, perceived enjoyment plays a critical role in shaping user attitudes and behavioural intentions. When users perceive the application as enjoyable, they are more likely to engage with it frequently and sustain usage over time (Zhao & Bacao, 2021). Gamification further enhances this effect by embedding playful and interactive features that increase intrinsic motivation and strengthen the perceived enjoyment of technology adoption (Koivisto & Hamari, 2019). Moreover, recent studies indicate that perceived enjoyment significantly predicts continuance intention, particularly in digital payment and mobile banking environments, where users perceive fun, satisfaction, and positive emotional experience as added value beyond functional utility (Chawla & Joshi, 2020). Thus, incorporating enjoyable and game-like elements into mobile payment applications not only facilitates initial adoption but also motivates ongoing engagement and loyalty.

2.14.1 The Relationship Between Perceived Enjoyment and M-payment Continuance Intention

The impact of perceived enjoyment on system use was confirmed in previous research (Chang et al., 2017), and its role as an external factor in the TAM model is widely utilized (Chan, 2019). Perceived enjoyment is the extent to which a technology is perceived to be fun apart from any outcome consequences that may be predicted (Davis, Bagozzi, & Warshaw, 1992). Meanwhile, Park et al. (2019) defined perceived enjoyment in information systems as the level of fun when performing activities using a particular system, apart from any performance consequences that arise from the usage of the system. Perceived enjoyment is an intrinsic motivation that is connected with the feeling of enjoyment in the usage process of a system (Praveena & Sam, 2014). Therefore, in this study, perceived enjoyment is defined as the degree to which mobile payment usage is perceived to be enjoyable, aside from performance consequences.

Previous studies have suggested that perceived enjoyment has a significant effect on usage intention and adoption. This element was found to be strongly connected to computer usage intention (Igbaria et al., 1995). Teo et al. (1999), in their study on Internet usage, suggested that usage is affected by both perceived usefulness and perceived enjoyment. Their results also showed that perceived enjoyment has significant implications for the frequency of use. Later, Moon and Kim (2001), who investigated the effect of perceived usefulness and perceived playfulness (perceived enjoyment) on Internet usage, found that perceived enjoyment has a significant mediating role on intention.

A study by Nguyen (2015) proposed that comprehensive discussions on the role of perceived enjoyment are worthwhile, as they encourage a better understanding of consumer retention and continuance usage of mobile device applications such as games. In technology usage, pleasure or perceived enjoyment creates changes in consumers' affective conditions, which eventually form positive feelings (Casaló et al., 2017). Furthermore, interactivity with technology that is perceived as enjoyable shapes the anticipation that the user will obtain an internal psychological benefit, which is sufficient to encourage continuance technology usage (Igbaria et al., 1995). When an activity is perceived as fun, users are motivated to repeat it (Suki & Suki, 2011). Accordingly, the likelihood of continuance usage will increase if users perceive enjoyment through mobile applications (Akdim et al., 2022). Hew et al. (2018) also

agreed that when users experience enjoyment, they are more likely to continue employing the mobile application.

H9: Perceived enjoyment significantly influences M-payment continuance intention among Malaysian users.

2.14.2 The Relationship Between Perceived Enjoyment, Gamification, and M-payment Continuance Intention

There are many studies investigating the effect of positive emotion, some of which have proven that enjoyment and happiness positively affect social behaviour. Due to positive stimuli, positive impressions such as enjoyment become an essential component in a balanced life. This is crucial, as being happy and harmonious brings people to feel safe, valued, and recognized as a necessary part of a group, while also encouraging learning and helping within the community. Thus, enjoyment is considered to have the ability to create and support community, as it can induce positive memories and strengthen them (Hernik & Jaworska, 2018). Perceived enjoyment from mobile payment allows users to experience happiness and harmony, which subsequently makes them feel it is necessary to keep using mobile payment as a means to help their community and surrounding. – (Meaning)

Referring to Cherry (2023), self-efficacy is an individual's belief in their capability to accomplish a goal and surpass challenges. It can impact everything, including psychological conditions, behaviour, and motivation, because self-efficacy emphasizes personal development (Bandura, 1997). Apparently, perceived enjoyment has the ability to enhance self-efficacy, which in turn drives a greater likelihood of improved behaviour (B. A. Lewis et al., 2016). Moreover, self-efficacy and enjoyment are interrelated and play a crucial role in continuance intention (Wang et al., 2019). Therefore, the enjoyment that users perceive from using mobile payment enhances their personal development, which later acts as an internal motivator driving them to continue employing the application. – (Development)

Next, pleasure is an emotion that follows anticipation, acquisition, or possession of something enjoyable or desirable (Kayina et al., 2014). Previous research has viewed enjoyment as a reason to see a good or service as cherished, treasured, and emotionally bonded (Richins, 1994). Users who obtain enjoyment from experiences may develop emotional attachment to the things they use and may find it difficult to live without

them. In this case, they become psychologically engaged. As stated by Xu (2023), perceived enjoyment is positively related to users' emotional attachment. Emotional attachment often stems from possessions, which people use to sustain their self-concept (Ball & Tasaki, 1992). When perceived enjoyment is experienced by users, their emotional attachment increases, leading them to feel stronger possession and control over mobile payment applications. This, in turn, motivates them to continue their usage. – (Ownership)

Despite many studies supporting the influence of perceived enjoyment on perceived usefulness and perceived ease of use rather than social influence, subjective norm (social influence) and perceived enjoyment are also positively linked (Dickinger et al., 2008). Enjoyment and excitement have been affirmed to positively affect word of mouth (social influence) (Milaković et al., 2020). Emotional pleasure has been shown to significantly relate to willingness to share information and to participate in word of mouth spread (Alsulaiman et al., 2015; Loureiro & Ribeiro, 2014). People like to talk about their emotions, excitement, and joy, which stimulates word of mouth communication (Milaković et al., 2020). It is a part of human nature to spread useful information about something enjoyable within their social circles and to share experiences that benefit everyone. One of the strongest reasons people recommend things they enjoy is because it allows them to multiply their own good feelings (Shen et al., 2019). Therefore, perceived enjoyment in mobile payment usage reinforces the influence of others' opinions on users' thoughts about the application, which subsequently impacts their continuance intention. – (Social influence)

Besides, curiosity is found to be related to perceived ease of use (Manis & Choi, 2019) and perceived enjoyment (Liu et al., 2019). The level of a person's motivation determines the extent of their desire to search for information (curiosity). When this desire for information is encouraged by positive emotions such as enjoyment, the passion to obtain and learn new information becomes stronger (Acikgoz et al., 2023). Perceived enjoyment makes the mobile payment application more fun and interesting. Users have a tendency to become curious about information system technology when they are fully engaged in an activity that they perceive as fun (Chang et al., 2013). – (Unpredictability)

Finally, users are motivated to keep using mobile payment if they trust the application and will avoid it if there is a lack of trust. Trust exists when users possess sufficient knowledge and information about the advantages of fintech platforms and

how these platforms support the ease of financial transactions (Kurniasari et al., 2022). Affect infusion occurs when affectively loaded information influences judgmental processes. This encourages affective reactions such as enjoyment to influence trust (Giovannini et al., 2015). It can therefore be accepted that perceived enjoyment contributes to avoidance, as it enhances users' motivation to continue using mobile payment out of trust, enabling them to avoid the losses associated with not benefiting from its advantages. – (Avoidance)

H10a: Perceived enjoyment mediates the relationship between meaning and M-payment continuance intention.

H10b: Perceived enjoyment mediates the relationship between development and M-payment continuance intention.

H10c: Perceived enjoyment mediates the relationship between ownership and M-payment continuance intention.

H10d: Perceived enjoyment mediates the relationship between social influence and M-payment continuance intention.

H10e: Perceived enjoyment mediates the relationship between unpredictability and M-payment continuance intention.

H10f: Perceived enjoyment mediates the relationship between avoidance and M-payment continuance intention.

This study proposes that attitude and perceived enjoyment function as mediating variables between gamification drivers and continuance intention. Attitude is expected to act as a cognitive-based mediator influenced by utilitarian and social evaluations, while perceived enjoyment operates as an affective-based mediator driven by intrinsic and experiential responses. Accordingly, mediation in this study is conceptualized as partial and parallel, where different gamification drivers may influence continuance intention through either attitude, perceived enjoyment, or both depending on their functional or hedonic orientation. Attitude represents a rational and evaluative judgement toward mobile payment, whereas perceived enjoyment reflects an emotional and intrinsic reaction during system use; therefore, gamification drivers are expected to influence these mediators differently depending on whether the mechanism is cognitive or affective in nature.

2.15 Mindfulness

Awareness is considered a crucial indicator of the success of performance. It contributes significantly to an individual's belief because all tasks, skills, or qualities that a person possesses or performs begin with awareness. Awareness offers insight and comprehension into beliefs, which helps to evaluate the positives and negatives in something. Being aware provides an individual with the advantage of knowledge to take the right steps necessary to bring about change or improvement. It drives individuals to search for more information on matters they are concerned about. The acquired information subsequently assists the next stage of thought, through which the individual becomes aware of the immediate next step to take in order to move forward. A person who is aware is considered a mindful person. This study incorporates the concept of mindfulness as a moderating factor to explore continuance intention among mobile payment (M-payment) users in Malaysia.

Mindfulness helps people develop their collection of information by gathering it from a variety of sources (Dane, 2011; Fiol & O'Connor, 2003). It also makes individuals more receptive and aware of their internal progress and conditions (Epstein, 1995). In this state, people use their own wisdom and vitality to make decisions (Kabat-Zinn, 1994, p. 4), becoming open-minded, calm, and more conscious of their own emotions, perceptions, beliefs, and thoughts (Dane, 2011; Kabat-Zinn, 1994; Kabat-Zinn, 2003). Furthermore, a mindful person is more likely to have greater confidence in their beliefs (Langer & Imber, 1980). Subsequently, such confidence helps individuals make decisions to adopt and continue using technology (Sun et al., 2016). However, in general, individuals may not necessarily be mindful at a particular moment when making decisions. Therefore, it is relevant to investigate the impact of mindfulness on decision-making (Sun et al., 2016).

A study by Ndubisi (2014) focusing on consumer behaviour and service found that mindfulness can increase user commitment, trust, satisfaction, attitudinal loyalty, switching restraint, and behavioural loyalty. Prior to this, Ndubisi (2012) evaluated the role of mindfulness in relation to reliability and quality and concluded that mindfulness is a strong element in describing the awareness and attention users apply in decision-making. When people are mindful, they are more focused on the functions and characteristics of certain technologies, which makes these technologies more adoptable. Particularly, when users acknowledge the convenience, novelty, or other positive traits

of mobile payment, they are more likely to choose it compared to other methods (Flavian et al., 2020).

Several definitions of mindfulness have been developed by previous researchers. Mindfulness is a state where people are conscious, aware of, or attentive to moment-to-moment experiences (Kabat-Zinn, 1990; Jha et al., 2007). Brown and Ryan (2003) further described mindfulness as a state where individuals give full attention to something through clarity and experience. According to Baer et al. (2008), mindfulness represents an individual's full awareness of something regardless of external or internal stimuli. Cardaciotto et al. (2008) defined mindfulness as the extent of an individual's awareness of external and internal experiences while maintaining a receptive and non-judgemental attitude towards those experiences. Similarly, Ganesan et al. (2014) emphasized mindfulness as involving active engagement with the environment, sometimes focusing on previous experiences while evaluating new information as it arises. Moreover, mindfulness is also described as the process of paying attention to something in the current moment while excluding judgements (Flavian et al., 2020). Thus, this study refers to mindfulness as a state where users are aware and attentive to their mobile payment experiences while comparing them with other methods when making decisions to continue using the application.

It is important to distinguish between trait mindfulness, which refers to a stable individual disposition to be generally attentive and aware across situations, and state mindfulness, which refers to a temporary cognitive condition that varies depending on context. This study adopts state-based mindfulness (MTA), as it focuses on users' situational awareness during mobile payment decision-making rather than a fixed personality trait.

For the purpose of technology adoption discussions, mindfulness has been proven to have a direct impact on technology adoption in prior studies. Roberts et al. (2007) conceptualized mindfulness in the information systems field to investigate its effect on technology adoption. They concluded that mindfulness is positively related to, and can be applied in, technology usage and acceptance. The uncertainty perceived by users can be reduced by mindfulness, thereby supporting technology adoption (Sun & Fang, 2010). Additionally, for users to adopt a technology, mindfulness is an important condition, as users must first gain a certain level of knowledge about it (Safeena et al., 2015). Tona and Carlsson (2014) suggested that mindfulness facilitates decision-making in the adoption of mobile business intelligence technologies. Similarly, Koksal

(2016), in research on mobile banking services, emphasized that users need to fully comprehend the service before adopting it. Stankov et al. (2020), in their study of tourism, highlighted how technologies such as mobile devices can influence users' perceptions to facilitate mindfulness practices. Purbondaru et al. (2022) found that mindfulness helps decrease users' uncertainty regarding digital wallets, which leads to their adoption. The degree of mindfulness among adopters further motivates them to explore applications in more detail, including usage and alternatives. Moreover, their study suggested that the perceived usefulness of an application is greatly influenced by mindfulness in technology adoption. This finding aligns with Sun and Fang (2010), who argued that mindfulness has a strong effect on perceived usefulness. On the other hand, Ganesan et al. (2014) observed that technologies such as mobile devices or smartphones can themselves support mindfulness practices by altering users' perceptions in the context of technology acceptance.

In the context of continuance usage, Sun et al. (2016) suggested that mindfulness has a significant impact on consumer acceptance and the continued use of technology. The concept of mindfulness has gained prominence in society, becoming an important predictor of how relevant a technology is to task contexts at the post-acceptance phase. A mindful user tends to be more aware of technology features and develops a broader perspective of its potential to support various activities. This drives users to be more adaptive and flexible when facing unpredictable circumstances in the post-adoption phase. Commonly, the most important and most recent experiences strongly shape individuals' overall assessment of a system (Fredrickson, 2000; Kahneman, Fredrickson, Schreiber, & Redelmeier, 1993). Thus, even a temporary but significant experience can shape a user's overall judgment. Moreover, the degree of mindfulness stimulated through training continues to influence user behaviour even one month later (Jensen, Dinger, Wright, & Thatcher, 2013).

Langer (1989a, 1997) developed a theory consisting of four elements of mindfulness: active information seeking and processing, constant creation of new categories, awareness of context-specific factors, and openness to multiple perspectives. Building on this traditional theory, Sun et al. (2016) formed a new concept termed Mindfulness of Technology Adoption (MTA) to explore the relationship between mindfulness and technology acceptance. MTA consists of four components: (1) Engagement with the technology, where a mindful person willingly engages with mobile payment transactions; (2) Technological novelty seeking, where users actively

search for new features and derive pleasure from them; (3) Awareness of local context, where users recognize the contexts in which mobile payments can be used, such as physical or online stores; and (4) Cognizance of alternative technology, where users compare mobile payments with other methods such as credit cards or cash. Sun et al. (2016) thus defined mindfulness as a state of user consciousness in which individuals explore technology in detail, applying it to both local contexts and alternative technologies.

Each dimension reflects the overall mindful state of the user in technology adoption. Engagement with technology captures active interaction, novelty seeking reflects exploration of new features, awareness of local context reflects situational relevance, and cognizance of alternatives reflects comparative evaluation of competing technologies. Together, these dimensions form a holistic representation of mindfulness in mobile payment usage. Figure 2.6 below demonstrates the MTA framework by Sun et al. (2016).

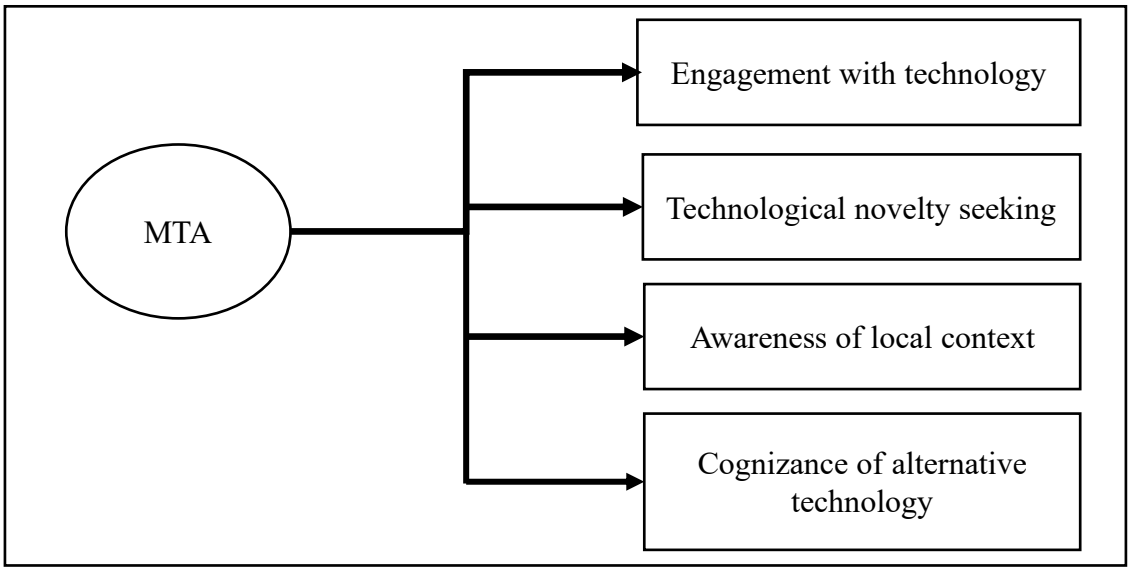

Figure 2.6 The Mindfulness Technology Adoption Framework

Sun et al. (2016) have indicated that Mindfulness of Technology Adoption (MTA) is a reflective second-order construct. Generally, behaviour is influenced by psychological states (Ajzen, 1991). Since MTA is a psychological state, it is expected to have an impact on behavioural sub-constructs. Such causality suggests that researchers should conceptualize MTA as a reflective second-order construct. This implies that user behaviour, as framed by its four sub-elements, should reflect the user's

mindful state. Therefore, this study conceives MTA as a reflective second-order construct.

In terms of its moderating role, Okafor (2023) argued that a favourable attitude can become part of a habit. When people repeatedly practice favourable attitudes, negative attitudes can be prevented. This process may be reinforced by promoting favourable thoughts such as mindfulness. Mindful individuals actively focus on both their internal and external surroundings, which allows them to evaluate the environment and respond to the prompts around them. The elements of mindfulness help people to become aware of the benefits of mobile payment usage, which eventually increases their engagement and shapes favourable attitudes towards the application.

Brown and Ryan (2003) further highlighted that mindfulness is a strong predictor of well-being as it develops experience and enhances positive emotions. It has been shown that mindfulness helps regulate emotions and reduce stress, leading to a greater sense of well-being. Mindfulness not only influences how people feel about something but also cultivates compassion toward it. Thus, a mindful person feels happier because he or she is capable of making wiser choices. Supported by Crego et al. (2021), the enhancement of happiness can be strengthened through mindfulness and behavioural activation. In this regard, a mindful user will be more aware of the advantages of mobile payment, such as its ease of use, which in turn stimulates their perceived enjoyment in using the application.

Mindfulness is expected to act as a boundary condition that strengthens users' cognitive processing of gamification-related stimuli. Specifically, individuals with higher mindfulness are more attentive to technological features, alternatives, and contextual relevance, which enhances the effect of gamification drivers on both attitude and perceived enjoyment. In contrast, users with lower mindfulness are less likely to actively process these stimuli, resulting in weaker psychological responses. Accordingly, mindfulness is conceptualized as a moderating construct rather than a direct predictor, as it shapes the strength of cognitive and affective responses generated by gamification drivers in the post-adoption stage.

2.15.1 Engagement with Technology

The terms such as "customer engagement," "customer engagement behaviour," or "consumer brand engagement" have been commonly applied to investigate

engagement among consumers. This is usually emphasised on the engagement subject, such as the consumer, or the engagement object, such as a service or brand. Engagement can be studied in three ways: the psychological, the behavioural, and the combination of behavioural and psychological. As stated by Hepola et al. (2020), user engagement with technology has attracted the attention of both practitioners and academicians, and it has proliferated in marketing literature. Previous years have witnessed numerous studies that have conceptualised user engagement, developed measurement instruments, and provided deeper comprehension into the area of user engagement.

User engagement can be conceptualised in several ways (Gupta et al., 2008), however, there is little agreement on its definition. Oh et al. (2017) refer to engagement behaviours as the behaviour of customers towards a brand resulting from motivational factors. On the other hand, Kumar et al. (2010) include transactional behaviour and propose that engagement behaviour occurs when a consumer interacts or engages with the firm, leading to an increase in purchasing activity. Similarly, Pansari and Kumar (2017) view user engagement as an indicator of consumer value addition to the firm, whether through direct or indirect contributions. The founder of MTA, Sun et al. (2016), defined engagement with technology as the extent to which an individual actively searches for information about a technology's functionality. Hence, in this study, engagement with technology is understood as the degree to which a consumer identifies and recognises the functional use of mobile payment in detail when using it.

User engagement is anticipated to have a favourable relationship with continuance intention for two reasons. First, users generally desire to perform actions consistently, implying that user intention should align with their prior behaviour. Second, a high degree of activation may lead to routine behaviour. This means that users will intend to perform actions consistent with prior behavioural patterns without substantial decision-making (Ouellette & Wood, 1998). Therefore, user engagement behaviour is considered to be positively linked with continuance intention to use a service. Supporting this, Williams et al. (2015) also suggested that there is a relationship between user engagement and behavioural intention.

Referring to Lewis (2020), purpose in life can be determined by continuous engagement. In Lewis's context, when a person stays engaged with a "goal," purpose and meaning can be shaped. The "goal" here refers to something that people actively seek through experiences and activities in order to obtain purpose (Kashdan & McKnight, 2009). The pursuit of such a "goal" in a new area (e.g., deciding to continue

using mobile payment) may encourage users to engage with their area of interest and promote purpose and meaning in that domain. Furthermore, engaging in such a goal enables users to expand their current sense of purpose.

Moreover, current mobile applications provide many self-service options that allow effortless and engaging interactions. For instance, one-step bill payments, flexible transactions, personalised preferences, and transaction alerts are common features. These options foster user engagement with mobile payment applications. The more users engage with such activities, the more positive progress and beneficial changes they experience in their daily lives. This is because an app that has user-centred design contributes to making users' lives easier (Mindgrub, 2021).

In mobile payment applications, the ability to control privacy, such as safeguarding users' card details, is very important. Engagement with the application can empower users by providing more active ownership over their privacy (Namara et al., 2022). Adaptation methods, such as privacy adaptation, can be presented to consumers and vary in the extent of autonomy and control (Namara et al., 2022). In addition, Roque (2023) indicated that user engagement fosters the investment of emotional feelings toward a product. The more engaged the users are, the stronger their emotional attachment becomes, giving them a sense of ownership and reducing the likelihood of switching to competitors.

Chang and Lin (2015) found that user engagement with gamified systems is positively related to intrinsic and extrinsic incentives, enjoyment, and social interaction. Later, Hamid and Kuppusamy (2017) added that user engagement in gamification plays an important role in value chains, innovation, and word-of-mouth advertising (social influence). When users are engaged with something, they tend to share their experiences with others. If their experiences are favourable, they are more likely to share positive information and recommend the service to others (Islam & Rahman, 2016). The resources used to promote product identity by developing strong relationships with users determine the level of success in user engagement. A high level of awareness and engagement increases the likelihood that experienced users will continue using the service on their mobile devices. When users are satisfied, they often recommend the service to others. Supporting this, van Doorn et al. (2010) suggested that marketers should pay attention to user engagement behaviour that extends beyond transactions, such as providing reviews, offering recommendations, or engaging in other word-of-mouth activities, to sustain consumer participation with the product.

Furthermore, gamifying applications and mobile user interfaces can foster user engagement and subsequently strengthen competitiveness, social behaviours, and curiosity. This is why providers employ gamification in mobile applications and software development, encouraging users to actively explore and engage with the app's functions. Curiosity-driven behaviour motivates users to pursue progress and seek rewards. When users are curious about what happens next, they are more likely to continue using the application (Tasyürek, 2021).

Finally, the functions and features of mobile payment make it easier for consumers to obtain goods or services, while providing the added advantage of security to protect them. This helps to promote trust between consumers and mobile payment applications, leading to future business opportunities and potentially fostering loyalty. Such trust also reduces the likelihood of users avoiding mobile payment adoption (Mindgrub, 2021).

2.15.2 Technological Novelty Seeking

Novelty seeking is referred to as the level at which an individual is responsive to new ideas (Holbrook & Hirschman, 1982). Meanwhile, novelty seeking in technology describes people's willingness to adopt and/or try new technology (Robinson et al., 2005), which is considered a relatively stable personal trait in both personal and professional life. A highly innovative user will be more interested in seeking information about new technology and ready to use it before others (Hodovic & Kalajdziv, 2019).

A mindful person constantly creates new categories (Langer, 1989). When accepting a technology, a mindful user consciously compares the technology with other technologies that already exist to search for its uniqueness, which later forms a new category in regard to current technologies or methods. For instance, a mindful user has the tendency to see how different mobile payment is compared to other methods. By understanding the nuanced differences, the user will be aware of mobile payment's uniqueness and see it as a new digital payment category.

According to Okazaki et al. (2007), novelty seeking is defined as consumers' inclination to trace innovative technology. Additionally, novelty seeking is described as people's willingness and propensity to accept technology (Andreassen & Streukens, 2013). It is also generally regarded as people's need for change (Sheth et al., 1990) and

curiosity to find new information (Holbrook & Hirschman, 1982). Novelty seeking means trying to use technology and service (Bagozzi & Dabholkar, 2002). Novelty seeking can be accepted as an individual's motivation to search for differences between current perceptions and previous experiences (Cohen, 1979; Jang & Feng, 2007). Meanwhile, the founder of MTA defined technological novelty seeking as the extent to which an individual makes comparisons of a technology with current technologies to raise awareness of its uniqueness (Sun et al., 2016). Therefore, for this study, technological novelty seeking refers to when the user explores how it is different by comparing the mobile payment method with other methods such as credit cards or cash when using it.

Novelty seeking has also been found to have a link with the encouragement of hedonic value. The higher the novelty seeking, the stronger the tendency to use a technology because of feelings of fun and enjoyment (Bagozzi & Dabholkar, 2002). It appears that novelty seeking has a direct positive impact on perceived entertainment (Okazaki et al., 2007). People who seek novelty in technology tend to have more positive attitudes towards innovation and a greater extent of acceptance. This means that novelty seeking influences user intention and behaviour (Ajzen & Fishbein, 2005).

As stated by Cooper (2013), the effect of novelty seeking in the brain is similar to the effect of dopamine. It is commonly connected to the "reward chemical" or part of the brain that forms the "reward centre." However, novelty is actually more closely associated with people's motivation to seek accomplishment rather than the reward itself. Being a mindful person increases the user's novelty-seeking propensity, which stimulates the motivation to seek accomplishment in using mobile payment.

Among consumers who have the urge to develop and change, those who prefer to adopt and use technology will more greatly perceive the benefits of innovation (Gielens & Steenkamp, 2007). More specifically, these perceived benefits in technological services positively influence perceived value (Rao & Budde, 2015). In addition, novelty seeking enhances the perceived value of service, particularly in circumstances where users have a precise need for mobile payment services, such as at a QR code terminal, when in a hurry, or when without cash (Pihlstrom, 2008). A novelty seeker will better perceive the advantages of mobile payment, which helps satisfy the user's urge for development and change.

Referring to Rindova and Petkova (2007), researchers have acknowledged that perceived novelty of a technology and/or service influences the cognitive and emotional

aspects that form consumers' evaluation of value. Thus, it can be assumed that the cognitive and emotional responses of mindful users are affected by novelty seeking, which may invoke a feeling of possession of mobile payment. This is because the feeling of possession is positively associated with emotional value in users.

Previous studies have shown that people who are flexible and open-minded towards new ideas are heavy consumers of interpersonal communication (Bayus et al., 1985), which can be considered as an intrinsic motivation for word of mouth. Moreover, users with high novelty-seeking tendencies show greater inclination to favour technology and exhibit stronger intrinsic motivation to use it (Bagozzi & Dabholkar, 2002). Furthermore, Okazaki (2009) proposed that the greater the inherent novelty seeking, the stronger the tendency to take part in information exchange with others. The need for communication and interaction with peers, family, friends, or surrounding people is enhanced by the novelty-seeking propensity due to spontaneous and timely reciprocity of opinions.

As suggested by Jang and Feng (2007), there is a connection between novelty seeking as a personal trait with curiosity and sensation seeking. In the study by Goo et al. (2022), it was noted that uncertainty may bring positive effects, whereby people are encouraged to promote pleasant experiences that differ from their typical daily routines. People observe their surroundings with curiosity because they are seeking novelty. A mindful user is commonly a novelty seeker. When the propensity to search for novelty in mobile payment is high, greater curiosity for seeking information about the application is triggered.

Novelty seeking appears to have a link with favourable attitudes towards technological innovation and decision-making (Cloninger et al., 1993). It is associated with the inclination of individuals to search for new services distinct from previous ones (Hodovic & Kalajdziv, 2019). For mindful individuals, novelty seeking serves as a motivation to identify originality, which later influences adoption of the product (Manning et al., 1995). It has been suggested that novelty seeking is part of the perceived value associated with people's interest in technologies. It describes their psychological concerns, such as adoption and novelty seeking, which encourage perceived value in service consumption (Prodanova et al., 2019). This perceived value eventually motivates users to continue using mobile payment to prevent losing it.

2.15.3 Awareness of Local Context

To fully adopt a technology, users are required to alter some changes in their existing transactions or activities so that they can obtain advantages from technology usage. If they perceive the technology as not compatible with their previous experiences, needs, or lifestyle, the tendency to reject it is high (Azmee & Azami, 2023). Tim (2019) stated that when there is incompatibility between consumers' experiences and technology, they will refuse it without evaluating its usability and advantages.

In mobile domain development, context awareness is crucial due to the growth of mobile devices in people's routine life (Rakotonirainy et al., 2000). Context awareness facilitates an application to give appropriate feedback to gain advantages from these changes. Context can be accepted as any information that is used to learn the situation of an entity. This entity could be a person, a place, or an object that is significant in the association between an application or a technology and its consumers (Cao & Niu, 2019). Meanwhile, context awareness (context as in location) recognizes close hosts and available devices, and any changes that happen to them (Schilit et al., 1994). It allows applications to learn the surroundings and respond accordingly, in the perspective of what resources are nearby to users, who the users are, and where the users are (Cao & Niu, 2019). An application software involves context awareness if it offers relevant information or services to the users based on their tasks or needs (Cao & Niu, 2019).

Technologies are created to complete certain jobs or tasks and for particular technical environments in some work fields (Burton-Jones & Grange, 2013). Meanwhile, users' local specifics are usually complicated, involving learning ability, accessibility of technical support, compatibility with previous technologies, and others' responses to it. They need to acknowledge these issues so that the technology and their tasks are aligned. When there is misalignment between technology and users' local context, it causes a waste of investment. This problem commonly happens to less mindful users who ignore local specifics during decision making. When technology adopters are aware of local context, it is better for them to employ the technology to enhance their performance or change the way they complete their tasks. Plus, the users are also realizing the inconvenience that the accepted technology may bring (H. Sun et al., 2016).

The founder of MTA, Sun et al. (2016), defined awareness of local context as the level to which individuals think about how a technology fits or is compatible with their local specifics and needs. Awareness of local context in mobile payment can be accepted when users employ mobile payment to help their shopping experiences and purchases (Flavian et al., 2020). Hence, awareness of local context for this study is the degree to which users think about how mobile payment fits and is compatible with their local specifics and needs.

Due to Covid-19 transmission risk, people were exposed to infected individuals or with environments, objects, and surfaces used by infected individuals. Therefore, the contactless feature of mobile payment offered mental and physical support to improve and maintain users' experience in purchasing transactions (L. Zhao et al., 2012). Furthermore, the restrictions implemented by governments helped the adoption of mobile payment due to its contactless features and trustworthy performance. Users' favourable cognition and perception of safety when employing mobile payment were created as the app helped to reduce virus transmission risk, secure personal safety, and improve the social economy (Zhao & Bacao, 2021). Aligned with Istijanto and Handoko (2022), previous research found that the outbreak of Covid-19 witnessed the acceptance of mobile payment for its contactless features and dependability (Musyaffi et al., 2021). This is because people saw that mobile payment enabled them to decrease social interactions, reduce virus transmission risk, enhance security, and also support the social economy (Yang et al., 2021). This shows that mobile payment fit the local specifics and needs of users during the Covid-19 phase. Thus, a mindful user would adopt mobile payment to do something beneficial, such as reducing virus infection among society and improving the economy.

Next, fintech applications like mobile payment enable users to personalize services and also offer simple operations to help individuals with low income manage their finances and investments, which could develop consumer experience and inclusive finance (Lagna & Ravishankar, 2022). As compared to previous payment methods, mobile payment commonly has the advantage of face recognition technology, which encourages positive user experience and efficiency of transactions. Plus, it also consists of chat boxes with artificial intelligence (AI) technology, where it could innovate services, satisfy users' preferences, enhance customer relationship management (CRM), and improve user experience (Berman & Katona, 2020; Youn & Jin, 2021). A mindful

user who acknowledges these advantages of mobile payment will be more likely to adopt this app, as he is motivated to use it to enhance life progress.

Payment transactions using mobile devices are now ubiquitous because mobile phones have become necessary communication tools for everyone in the world. Mobile devices contain equipment, infrastructures, features, or protocols that enhance users' communication and data exchange without intermediaries (Lim, 2007). These consist of information and functions that affect users' perceived control. Meaning, the interface design and features will shape users' perceived control (Zhang et al., 2019). Thus, it can be assumed that if the mobile payment interface fits consumers' local specifics and needs, it helps to form users' perceived control. The higher the perceived control, the stronger the feeling of ownership of mobile payment among users.

Not only that, Roy et al. (2017) found that fintech applications such as mobile payment increase word of mouth (social influence) in the retail industry. This is because its perceived usefulness (performance) and efficiency in transactions raise the word of mouth of this financial platform (Liu et al., 2023). Also supported by Li et al. (2023), fintech applications with great functions help the spread of word of mouth. This means that if mobile payment functions and performance meet users' local specifics and needs, they will disseminate information about it to others.

Besides, Ibidunmoye (2018) indicated that the features and functions provided in mobile payment are capable of triggering curiosity among users, which also facilitated lively discussions. Undeniably, mobile payment systems have become a prominent payment method due to their convenience, feasibility, and flexibility. They allow consumers to make transactions in both physical stores and online, built with great functions that store card details and bank statements, and filled with rewards such as vouchers. These great functions and features presented in mobile payment stimulate users' curiosity, especially when they meet their needs. When users are aware that the features and functions in mobile payment fit their local specifics and needs, their curiosity towards mobile payment performance is heightened.

Lastly, compatibility is the integration of the potential, available values, and innovations. It consists of the effective performance of technology to improve task performance (Lee, McGoldrick, Keeling, & Doherty, 2003). It is also a predictor associated with innovation in mobile payment services that involves its interoperability with consumers' needs, lifestyle, and capability to try new functions. This promotes awareness of mobile payment performance to users (Ding et al., 2004). Later, users are

able to include it in their shopping experiences and daily routines (Teo & Pok, 2003). Stated by Tian et al. (2019), the compatibility and functions of fintech decrease security risks, which eventually motivates users to employ mobile payment so that they can prevent their local specifics and needs from not being fulfilled.

2.15.4 Cognizance of Alternative Technology

The purchases or any transactions can be conducted via mobile payment method, which has eventually become a more improved medium of payment and now competes with previous payment methods such as cash, cheque, credit card, or debit card. It provides a new medium for account-based services, for instance, bank account number method or online banking (Kim et al., 2010). Many areas of application and mobile phones have proposed that mobile payment may become a common medium of payment. Based on the development in payment markets, innovative mobile payment services have been frequently implemented; however, the links between payment alternatives are still under discussion. It is crucial to comprehend that users' choice of payment instruments is dependent on the advantages and disadvantages of the alternatives. This significantly impacts the effectiveness and efficiency of the whole payment system and shapes financial stability (Trütsch, 2016).

Not just that, a mindful user is also aware of its pros and cons in contrast to other alternatives. Such balanced and flexible perspectives about mobile payment help the user to shape realistic anticipations. For example, a user may think that credit card or cash is the best choice among payment methods due to its large market share and extensive adoption before this. However, after the emergence of mobile payment and by being mindful in comparing these methods, the user may select mobile payment as more suitable with current needs. After the process of measuring these payment alternatives, the user is more realistic about the advantages and disadvantages of each method. In turn, they will be unbiased and prevented from making careless conclusions based on bandwagon effects (Fiol & O'Connor, 2003). Hence, mindfulness is needed to remove the overestimation or underestimation of a technology's pros and cons (H. Sun et al., 2016).

Referring to Flavian et al. (2020), cognizance of alternative technologies is a person's awareness of the dissimilarities between a technology and other options, and her or his selection of the technology over other available choices. This means that when

conducting monetary activities using mobile payment, the person is aware of other payment options such as cash or credit cards. Meanwhile, Verhoeven et al. (2018) indicated that cognizance of alternative technologies is when an individual makes a comparison between current technologies, especially by implementing the awareness of alternative perspectives of the novel technology, as well as its pros and cons. The founder of MTA, Sun et al. (2016), stated that cognizance of alternative technologies can be defined as the extent to which an individual is aware of a technology's other options and their pros and cons. Therefore, this study defines cognizance of alternative technologies as the degree to which mobile payment users are aware of other payment options and their advantages and drawbacks.

If the users see that a technology is unable to function with precise, accurate, and timely information associated with the setting of the device, they will refuse to use it despite the advanced perception about the information technology. The continuance intention to use mobile payment relies on both user perception and good context-awareness. The capability for preparing context-based information or services is important to encourage the continuance intention to use mobile payment (Khayer & Bao, 2019).

To decrease the spread of Covid-19 virus, the practice of social distancing was recommended (Chang et al., 2020). Given this circumstance, consumers became accustomed to digital payment during this period. It was indicated that Malaysians were optimistic to employ digital payment even in the absence of incentives, with a record of 91 percent. Now that circumstances are returning to normal, the continued use of digital payment is still high, with a record of 85 percent regardless of incentives and despite the decline in 2021 (Oppotus, 2023). After acknowledging the benefits of mobile payment even without incentives, users still chose it over debit/credit cards or cash as it helped them contribute to reducing the spread of viruses.

Not just that, if we refer to the current marketing landscape, customers appreciate providers that deliver value by including amenities during activities that involve purchases and the use of services (Roy et al., 2017). Apparently, users value a technology best when it encourages their life development by making their lives easier (Handarkho & Harjoseputro, 2019). When compared to other payment methods, mobile payment has a variety of functions, features, and user benefits that support this approach (Al-Qudah et al., 2022).

In contrast to traditional payment methods, several previous researches affirmed that mobile payment is more secure (Johnson et al., 2018). This perceived security is related to users' perceived control, awareness of general information technology (IT), and knowledge. Perceived controllability has the strongest impact (Huang et al., 2011). Since mobile payment is more secure than other alternatives, users perceive it as more controllable, which in turn increases their perceived ownership.

Besides, it is likely that social influence and the perceived advantages of mobile payment service are related to each other. Users can be affected by perceived social pressure from other people, and this is also associated with users' perception of the advantages of mobile payment services (Park et al., 2019). The influence from other people is strengthened by the perceived benefit of mobile payment when users compare it with other alternatives.

According to Taggart (2022), with a good point-of-sale system, mobile payment can help to decrease wait times and remove long lines as the checkout process is sped up. A quick checkout during purchases encourages user satisfaction and raises the continuance intention to reuse the services. Compared to other payment methods, it shows that mobile payment contributes benefits to user experience, which in turn helps to fulfil their curiosity about mobile payment.

As mentioned by Al-Qudah et al. (2022), mobile payment has a variety of features and user benefits, which in turn reduce the perceived risk in consumer behaviour involving two distinguished elements. First, consumers face uncertainty when there is lack of knowledge regarding what will occur when adopting the mobile payment method. Second, there is the probability of unexpected outcomes of this payment method (Al-Qudah et al., 2022). When users acknowledge the benefits that they can receive from using mobile payment after making comparison with other options, the perceived risk can be lowered. Hence, users will keep using mobile payment to avoid losing the perks.

H11a: The moderating effect of mindfulness on the relationship between meaning and attitude is more positive for people with a high level of mindfulness.

H11b: The moderating effect of mindfulness on the relationship between development and attitude is more positive for people with a high level of mindfulness.

H11c: The moderating effect of mindfulness on the relationship between ownership and attitude is more positive for people with a high level of mindfulness.

H11d: The moderating effect of mindfulness on the relationship between social influence and attitude is more positive for people with a high level of mindfulness.

H11e: The moderating effect of mindfulness on the relationship between unpredictability and attitude is more positive for people with a high level of mindfulness.

H11f: The moderating effect of mindfulness on the relationship between avoidance and attitude is more positive for people with a high level of mindfulness.

H12a: The moderating effect of mindfulness on the relationship between meaning and perceived enjoyment is more positive for people with a high level of mindfulness.

H12b: The moderating effect of mindfulness on the relationship between development and perceived enjoyment is more positive for people with a high level of mindfulness.

H12c: The moderating effect of mindfulness on the relationship between ownership and perceived enjoyment is more positive for people with a high level of mindfulness.

H12d: The moderating effect of mindfulness on the relationship between social influence and perceived enjoyment is more positive for people with a high level of mindfulness.

H12e: The moderating effect of mindfulness on the relationship between unpredictability and perceived enjoyment is more positive for people with a high level of mindfulness.

H12f: The moderating effect of mindfulness on the relationship between avoidance and perceived enjoyment is more positive for people with a high level of mindfulness.

2.16 Literature Gap

In the literatures, there is always the presence of inadequate information, knowledge, or 'missing pieces' which are called the 'gaps'. Commonly, these gaps need more attention and further studies due to being unexplored, under-explored, or outdated. After completing the discussions above, this study has found several gaps in the literatures of M-payment continuance intention, gamification, and mindfulness. It is believed that these gaps need to be put under the spotlight to reduce the 'blank' in the mobile payment domain and subsequently contribute to the domain from both practical and theoretical perspectives, particularly by clarifying unresolved post-adoption relationships within gamified mobile payment usage.

In a scenario of rapid development of mobile payments, it has become a growing trend and a necessity to conduct further and in-depth studies on its adoption, which also include the impacts of different financial solutions on users' perceptions and their daily activities (de Luna et al., 2019). Furthermore, studies in this area need to be expanded because its traction is based on users' access to the technology, the changes in their lifestyles, and the influence of multiple and different economic factors (Liébana-Cabanillas & Lara-Rubio, 2017).

Despite the wide range of mobile payment studies, the majority of prior research mainly emphasized early adoption and usage. These initial acceptance studies also have a tendency to focus on the functional benefits and their effect on adoption behaviour (Khalilzadeh et al., 2017). However, there are very few studies on post-adoption of mobile payment, especially after entering the endemic phase of Covid-19. Furthermore, these studies tend to examine consumer intention (first intention or early intention) instead of continuance intention, where the users continue using mobile payment services, especially within QR-code based mobile payment systems in emerging markets such as Malaysia, where usage is widespread but sustained engagement remains uncertain.

The ubiquity of mobile payment studies in technology adoption has also affirmed the lack of exploration of the applications and effectiveness of gamification. In addition, the application of gamification is usually associated with younger users (Wang & Sun, 2016). The limited studies on technology adoption associated with older generations show little consideration of gamification in enhancing technology adoption at any significant level (Benson et al., 2018).

Besides, there is little research that has evaluated gamification characteristic measurement scales in regard to different elements such as motivation, productivity, or engagement. Moreover, most prior research that employed gamification did not use the core drivers proposed by Yu-Kai Chou in 2014. For instance, Klesel et al. (2016) suggested that more investigation is needed to comprehend the complexity of ownership in relation to the rapid development of technology. Another example is Karac and Stabauer (2017), who stated that development and accomplishment have been investigated as drivers mostly in the online fashion industry rather than in the mobile payment area, thereby limiting empirical validation of these drivers in post-adoption QR-code payment environments.

Up to now, the involvement of mindfulness in decision-making regarding technology acceptance at the individual level has remained scarce. A study by Sun and Fang (2010), which formed a model of mindfulness in technology acceptance, suggested that there is little comprehension of the effect of mindfulness at the post-acceptance phase. This is supported by Flavián et al. (2020), who stated that studies on mindfulness are still lacking in the marketing domain, even though it shares many similarities with perceived behavioural control, an element of the TPB model that emphasizes subjective and human cognition. Similar to gamification, many previous studies that applied mindfulness did not employ the MTA dimensions proposed by Sun et al. (2016). For example, Prodanova et al. (2019) noted that there is little general agreement in the conceptualization of the second dimension of MTA, namely technology novelty seeking.

Finally, to the best knowledge of the researcher, there is no study on the continuance intention of mobile payment among Malaysians that applies Chou's (2014) gamification framework with the involvement of mindfulness as the moderator and two mediators, namely perceived enjoyment and attitude towards mobile payment, specifically within a post-adoption QR-code mobile payment context where continuance behaviour rather than initial adoption is the main focus of analysis. Therefore, the study addresses these unresolved relationships by integrating gamification drivers, dual mediators, and mindfulness as a boundary condition within a unified post-adoption framework.

2.17 Gamification Application

There are several previous researches that applied gamification as a set of ideas in different domains. These studies consist of different types of technology users, technology applications, and variables employed. The studies applied gamification as an independent variable, moderator, or mediator. The researcher prioritizes published research articles in academic journals and conference proceedings. The evaluated papers were collected from past studies in the latest years, as they are believed to provide more insight than those conducted several years earlier.

Furthermore, incorporating theories at various stages of the research process is essential, as it enhances the significance of findings, irrespective of whether the study follows a quantitative, qualitative, or mixed-method approach (Stewart & Klein, 2015). According to the results, most of the researchers employed technology use and acceptance models (TAM, UTAUT, and UTAUT2), which underpinned seven of the reviewed frameworks. All these models were combined with the concept of gamification. For example, Rahi and Abd. Ghani (2018) studied customer intention to adopt and recommend Internet banking in Pakistan by using the UTAUT model together with gamification. Nevertheless, other theories and models were also applied in previous studies. The details are summarized in the Table 2.5 below.

Table 2.5
Analysis of Theories/Models Combined with Gamification

Theories/ Models	**Frequency**
Unified Theory of Acceptance and Use of Technology II (UTAUT 2)	3
Unified Theory of Acceptance and Use of Technology (UTAUT)	2
Technoloy Acceptance Model (TAM)	2
Generational Cohort Theory	1
Self-System Model of Motivational Development (SSMMD)	1
Social Impact Theory	1
Customer Value Model	1
Perceived Value Theory	1
Conceptualization of gamification	1
Prospect Theory	1
ISS Theory	1
Octalysis gamification	1

Apparently, gamification is commonly employed outside of Southeast Asia, such as in the United Kingdom, Ghana, and the United States, and especially in China. Most of the studies did not use the Octalysis gamification framework proposed by Yu-Kai Chou. However, a study by Yang et al. (2023) applied Chou's (2014) Octalysis

framework and integrated it with the UTAUT2 model. Out of the eight core drivers, Yang et al. (2023) only used the third and last core drivers, namely ownership and avoidance. The study was conducted among mobile wallet users in China. The summary of studies that used gamification is presented in Table 2.6 as follows.

Table 2.6
The Application of Gamification in Previous Studies

Sources	Country	Context	Model/Theory/ Concept	Predictors	Mediators/ Moderators (if any)	Outcome
Thảo et al. (2018)	Vietnam	In-depth interviews with 10 potential customers who were asked to express their opinions to mobile payment services: 5	UTAUT model and Gamification	Performance expectancy(sig), Effort expectancy(sig), Social influence(ns), Trust(sig), Perceived financial cost(ns), Gamification(sig)		Behavioural intention
Rahi and Ghani (2018)	Pakistan	398 Internet users from five commercial banks	UTAUT model and Gamification	Website design(sig), Website characteristic(sig), General self-confidence(sig)		Customer's performance expectancy
				Website design(sig), Website characteristic(sig)		Customer's effort expectancy
				Website characteristic(sig)		Website design
				Performance expectancy(sig), Effort expectancy(sig), Website design(sig), General self-confidence(sig)		Customer's intention to adopt Internet banking
				Customer's intention to adopt(sig)	Gamification(sig)**	Customer's intention to recommend
Högberg et al. (2019)	Europe	223 real customers recruited at the entrance of a sporting goods store, aged between 18 and 79	No models or theories are specified	Gamification(sig)(ns:reward satisfaction)	Hedonic value*(sig), Positive affect*(sig), Reward satisfaction*(sig), Continued engagement intention*(sig)	Brand engagement
Çera et al. (2020)		380 questionnaires distributed to	UTAUT 2, Gamification, and	Behavioural intention(sig), Facilitating condition(ns), Habit(sig)		User behaviour

Sources	Country	Context	Model/Theory/ Concept	Predictors	Mediators/ Moderators (if any)	Outcome
		Generation X and Generation Y	Generational cohort theory	Performance expectancy(sig), Effort expectancy(ns), Social influence(ns), Facilitating condition(sig), Habit(sig), Hedonic motivation(sig), Gamification(ns)	Generation**(sig:GM)	Behavioural intention
				Social influence(ns), Facilitating conditions(sig), Habit(sig), Hedonic motivation(sig)		Gamification
				User behaviour(sig)		Intention to recommend
Silic et al. (2020)	United Kingdom United State Australia UAE	398 employees, including both treatment and control groups from a large multinational company that introduced a gamified human resource management (HRM) system	Gamified HRM system	Enjoyment of gaming(sig), Recognition of gaming(sig)	Reciprocal benefit*(sig: recognition of gaming)	Job satisfaction
				Recognition of gaming(sig), Usefulness of gaming(sig), Motivation(sig)	Reciprocal benefit*(sig: recognition of gaming) Performance Expectancy-Extrinsic Motivation*(sig: usefulness of gaming)	Job engagement
Kim (2021)	South Korea	293 frontline employees - sales, service, and admin staff – working in automotive retailers in South Korea	Gamification (Gamification strategy)	Competition(ns), Challenge(ns), Compensation(ns), Relationship(ns), Usability(sig)	Flow* (sig: challenge, relationship, usability)	Intention of continuous use
				Competition(ns), Challenge(sig), Compensation(ns), Relationship(sig), Usability(sig)		Flow
				Flow(sig)		Intention of continuous use

Sources	Country	Context	Model/Theory/ Concept	Predictors	Mediators/ Moderators (if any)	Outcome
Bitrián et al. (2021)	USA	276 U.S. users of the Fitbit app	Self-system model of motivational development (SSMMD) and Gamification conceptualization of Koivisto and Hamari (2019)	Achievement(sig), Social(ns), Immersion(ns)		Competence
				Achievement(sig), Social(ns), Immersion(ns)		Autonomy
				Achievement(sig), Social(sig), Immersion(sig)		Relatedness
				Achievement, Social, Immersion	Competence*(sig)(sig:AC,SC)(ns:IM), Autonomy*(sig)(sig:AC, SC)(ns:IM), Relatedness*(sig)(sig:AC,SC)(ns:IM)	Engagement
				Achievement, Social, Immersion	Engagement*(sig)(sig:AC,SC)(ns:IM)	Continued use intention
				Achievement, Social, Immersion	Engagement*(sig)(sig:AC,SC)(ns:IM)	WOM intention
				Achievement, Social, Immersion	Engagement*(sig)(sig:AC,SC)(ns:IM)	App rating
Salimon et al. (2021)	Nigeria	388 respondents with previous experience of smartphone banking in Nigeria	TAM model and Gamification	Perceived usefulness(sig), Perceived ease of use(sig), Gamification(ns), Hedonic motivation(sig), Context(sig), Time perception(ns)	Hedonic motivation*(sig: PU, PeoU, GMF)	Smartphone banking usage
				Perceived usefulness(sig), Perceived ease of use(aig), Gamification(sig)		Hedonic motivation
Dzandu et al. (2022)	Ghana	567 mobile money service users in Ghana	An integrated Social Impact Theory and Customer Value model with Gamification	Gamified M-payment(sig)		Internalisation
				Gamified M-payment(sig)		Identification
				Gamified M-payment(sig)		Compliance
				Internalisation(ns), Identification(ns), Compliance(sig)		Customer engagement

Sources	Country	Context	Model/Theory/ Concept	Predictors	Mediators/ Moderators (if any)	Outcome
				Internalisation(sig), Identification(ns), Compliance(sig)		Satisfaction
				Internalisation(ns), Identification(sig), Compliance(sig)		Loyalty
Yu and Huang (2022)	China	1586 mobile commerce shoppers in China	Perceived value theory and Gamification	Utilitarian value(sig), Hedonic value(sig), Social value(sig), Time/effort(sig)		Game use intention
				Utilitarian value(sig), Hedonic value(ns), Social value(sig), Time/effort(ns)	Game use intention* (sig:UV,HV,SV,TE)	Platform purchase intention
Wong et al. (2022)	China	633 consumers aged 50 and over in local communities and colleges for the Chinese elderly (WeChat app users)	TAM model, Conceptualization of gamification, and Prospect theory	Perceived enjoyment(sig)		Perceived effectiveness of gamification
				Perceived effectiveness of gamification(sig), Perceived ease of use(sig)	Perceived usefulness*(sig:PEG, PEOU)	Attitude towards technology adoption
				Attitude towards technology adoption(sig)	Perceived risk**(sig)	Adoption intention
Malik and Singh (2022)	India	798 young consumers who had been using UPI-based mobile payments of service providers like (Paytm, Google pay, PhonePe, BHIM, and Amazon pay).	UTAUT 2 model and ISS theory	Performance expectancy(sig), Effort expectancy(ns), Facilitating condition(sig), Social Influence(sig), Hedonic Motivation(sig), Price value(sig), Habit(ns), Information quality(sig), System quality(sig)		Behavioural intention
				Behavioural intention(sig)	Gamified features*(sig)	The use of M-payment
				The use of M-payment(ns)	Trust**(sig)	Continuance use of M-payment

Sources	Country	Context	Model/Theory/ Concept	Predictors	Mediators/ Moderators (if any)	Outcome
Yang et al. (2023)	China	231 mobile wallet users with different education level, income and working background, with the age group of 18 to 36 years-old in China via online questionnaires.	UTAUT 2 model and Octalysis gamification	Performance expectancy, Effort expectancy, Facilitating Condition, Social influence, Hedonic motivation, Perceived value, Habit, Avoidance, ownership		Behavioural intention

Note: *=mediator, **=moderator, sig=significant, ns=not significant

2.18 Mindfulness Application

Same goes to gamification, mindfulness is also applied in several different areas that have a variety of variables used, types of technology, or different research contexts (non-technology adoption). Mindfulness was used differently in previous studies, as it can be an independent variable, moderator, or mediator. This study selects and employs mindfulness as the moderator. To make evaluations on mindfulness, the research papers were retrieved from academic journals and conference proceedings to obtain more reliable and latest information. However, all research articles collected from the year 2023 were unusable due to several reasons such as duplication or not being written in English.

Based on the review, mindfulness was studied primarily in Spain and the USA, as evidenced by Apaolaza et al. (2019), Li et al. (2021), Oyedele et al. (2018), and Ta and Prybutok (2018). Furthermore, there is a propensity among researchers to integrate the concept of mindfulness with the TAM model. For instance, a study by Purbondaru et al. (2022) indicated that mindfulness has a significant impact on perceived usefulness and perceived ease of use among mobile wallet users in Bengkulu City, Indonesia.

Besides, among the assessed articles, only Flavian et al. (2020) applied the MTA framework by Sun et al. (2016) and employed it as a reflective second-order construct. The study, conducted in Spain and the USA, focused on the mobile payment domain. They combined the MTA framework with the TAM model to offer more insight into this matter. After all, the results showed that all variables involved were significantly associated with each other. Nonetheless, the summary of studies that used mindfulness is presented in Table 2.7 on the next page.

Table 2.7
The Application of Mindfulness in Previous Studies

Sources	Country	Samples	Context	Model/Theory/Concept	Predictors	Mediators/ Moderators (if any)	Outcome
Ta and Prybutok (2018)	USA	565 students from a college of arts and sciences at the public university in North Texas.	Concerns about the environment is addressed in the bottled water context because of its ubiquitous use and increasing sales. TAM model is applied to a non-traditional technology	TAM model and Mindful judgement construct (trust/perceived safety)	Trust(sig), Perceived safety(ns)		Perceived usefulness
					Trust(sig), Perceived safety(sig)		Perceived ease of use
					Trust(sig)		Perceived safety
					Perceived usefulness(sig), Perceived ease of use(sig), Taste(sig), Environmental concern(sig)		Actual use
					Actual use(sig)		Future use
Oyedele et al. (2018)	USA	201 paper-and-pencil surveys administered to participants at a Midwestern USA university	Technology acceptance – Mobile Smart wristband	Theory of consumption value	Economic value(sig), Emotional value(ns), Convenience value(sig), Satisfaction(sig)		Repurchase intention
					Economic value(sig), Emotional value(ns), Aesthetic value(sig), Convenience value(sig)		Satisfaction

Sources	Country	Samples	Context	Model/Theory/Concept	Predictors	Mediators/ Moderators (if any)	Outcome
					Social mindfulness(sig)		Convenience value
Apaolaza et al. (2019)	Spain	346 active WhatsApp users	Technology usage - Mobile social media application, WhatsApp	No theories or models are specified	Mindfulness(sig), Compulsive social media use(sig)	Self-esteem*(sig,), Social anxiety*(sig),	Stress
Flavian et al. (2020)	Spain and USA	794 mobile payment users (380 from Spain and 414 from the USA)	Fintech – Mobile payment service	TAM model and MTA model	Perceived ease of use(sig), Mindfulness(sig): 1.Engagement with technology(sig) 2.Technological novelty seeking(sig) 3.Awareness of local context(sig) 4.Cognizance of alternative technology(sig)		Perceived usefulness
					Mindfulness(sig): 1.Engagement with technology(sig) 2.Technological novelty seeking(sig) 3.Awareness of local context(sig) 4.Cognizance of alternative technology(sig)		Perceived ease of use
					Perceived usefulness(sig), Perceived ease of		Attitude

Sources	Country	Samples	Context	Model/Theory/Concept	Predictors	Mediators/ Moderators (if any)	Outcome
					use(sig), Subjective norm(sig), Mindfulness(sig): 1.Engagement with technology(sig) 2.Technological novelty seeking(sig) 3.Awareness of local context(sig) 4.Cognizance of alternative technology(sig)		
					Perceived usefulness(sig), Subjective norm(sig), Attitude(sig)		Intention to use
Crego et al. (2021)	Spain	1267 women in Spain	Mental health and well being	No theories or models are specified	Mindfulness(sig: happiness, anxiety, depression)	Purpose in life*(sig), Behavioural activation*(sig)	Happiness, Anxiety, Depression
Shirish et al. (2021)	France	82 graduate students from an institution of higher learning in France.	Digital learning	IT mindfulness and MMT literature	learner's IT mindfulness(sig)	learner's techno eustress perceptions(sig)	learner's productivity-in-learning
					learner's IT mindfulness(sig)	learner's techno eustress perceptions(sig)	learner's creativity-in-learning
Li et al. (2021)	USA	102 the most senior IT executives		Information processing capacity	Digital technology-enabled external relationship management(sig), Digital technology-business strategic alignment(sig), Digital technology		Market agility

Sources	Country	Samples	Context	Model/Theory/Concept	Predictors	Mediators/ Moderators (if any)	Outcome
					infrastructure management(sig)		
					Digital technology-enabled internal relationship management(sig)		Digital technology infrastructure management
					Organizational mindfulness towards digital transformation(sig: DTBSA, DTERM, DTEIRM)		Digital technology-business strategic alignment, Digital technology-external relationship management, Digital technology-enabled internal relationship management
Oredo and Dennehy (2023)	Kenya	180 organizations in the financial, manufacturing and IT sectors	Digital technology	No theories or models are specified	Cloud computing adoption(sig)		Organizational mindfulness
					Cloud computing adoption(sig), Organizational mindfulness(sig)	Organizational mindfulness**(ns:CCA)*(sig:CCA)	Firm performance
Purbondaru et al. (2022)	Indonesia	257 E-wallet users	Fintech – Electronic wallet	TAM model	Mindfulness(sig: PU,PEOU)		Perceived usefulness, Perceived ease of use

Sources	Country	Samples	Context	Model/Theory/Concept	Predictors	Mediators/ Moderators (if any)	Outcome
					Perceived usefulness(sig), Perceived ease of use(ns)		Intention of use
Loannou et al. (2022)	United Kingdom	500 working individuals using IT	Technology usage – in working environment	Transaction theory of stress	Intention of use(sig) Technostress creator(sig), Mindfulness(sig)	Technostress creator*(sig)	Actual use Job satisfaction
					Technostress creator(sig), IT mindfulness(sig)	Technostress creator*(sig)	End user satisfaction
					Technostress creator(sig), End user satisfaction(sig)		End user performance
					IT mindfulness(sig)	Technostress creator*(sig)	End user performance
					Mindfulness(sig), IT mindfulness(sig)		Technostress creator

Note: *=mediator, **=moderator, sig=significant, ns=not significant

2.19 Conceptual Framework

This study's conceptual framework consists of M-payment continuance intention as the dependent variable, with six core drivers of Chou (2014)'s octalysis gamification selected as independent variables, mindfulness as the moderator, and two additional mediators. Octalysis gamification contains eight constructs, namely meaning (epic meaning and calling), development (development and accomplishment), ownership (ownership and possession), social influence (social influence and relatedness), unpredictability (unpredictability and curiosity), and avoidance (loss and avoidance). However, empowerment (empowerment of creativity and feedback) and scarcity (scarcity and impatience) are excluded due to their irrelevance for this study.

Additionally, mindfulness is included as a moderator, which involves engagement with technology, technological novelty seeking, awareness of local context, and cognizance of alternative technology. Although it involves these elements, mindfulness will be treated as a second-order construct. As MTA represents a psychological state, it is expected to influence the sub-constructs of behaviour. This causal relationship implies that researchers should consider conceptualizing the MTA model as a reflective second-order construct.

This concept is generated to discuss, predict, and acknowledge the context and, in many circumstances, to advance current knowledge within its boundaries. The conceptual framework is a formation that can justify the concept of study and lead it by deciding which variables will be evaluated and which statistical relationships will be identified. The conceptual framework, as illustrated below, is based on this research, where it consists of one dependent variable, six independent variables, one moderating variable, and two mediators. These independent variables are selected to be tested for their significant relationships with the dependent variable, mediated by attitude towards M-payment and perceived enjoyment, while moderated by mindfulness dimensions.

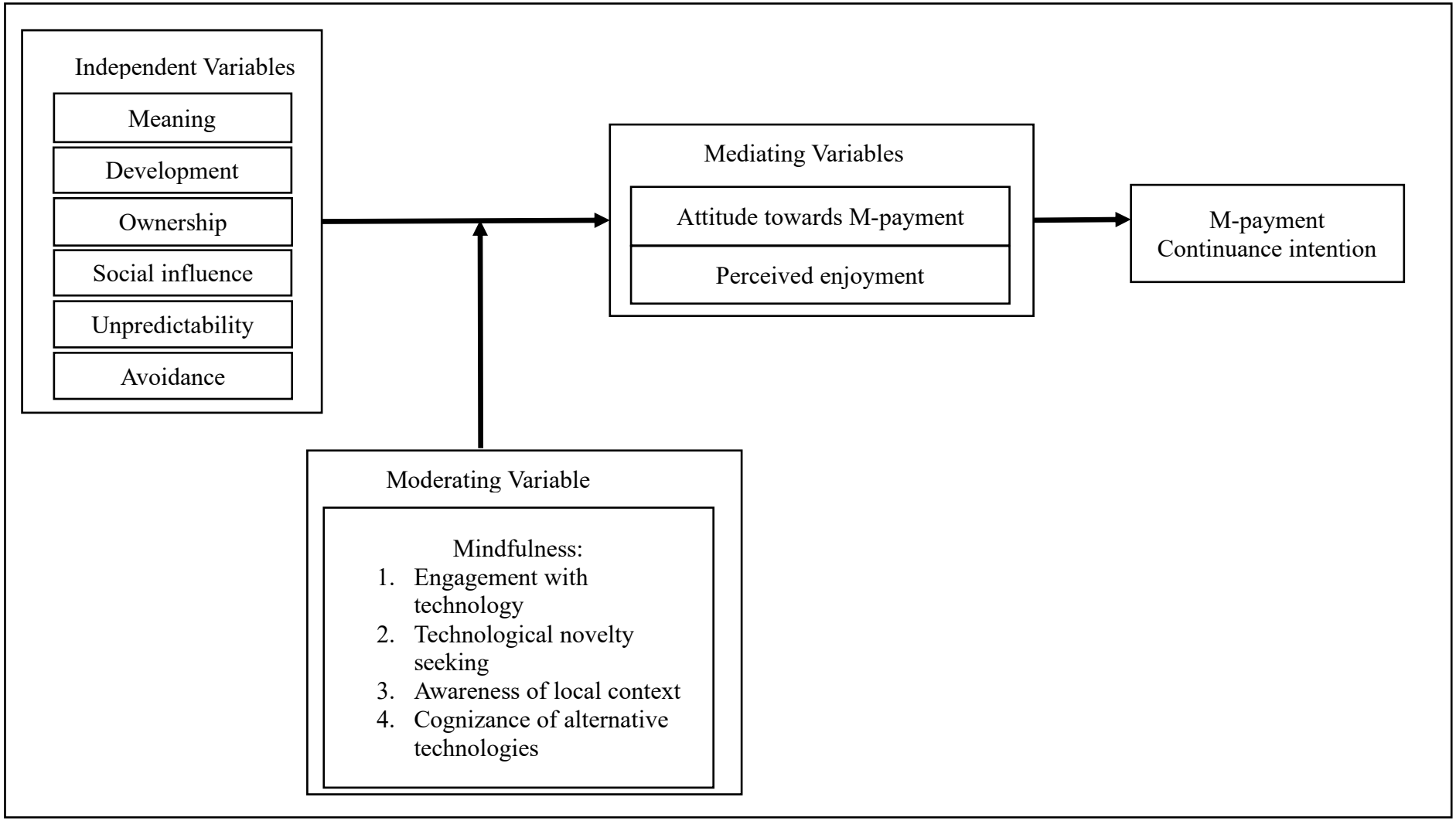

Figure 2.7 The Conceptual Framework of the Study

2.20 Conclusion

Based on the discussions above, the dependent variable, M-payment continuance intention, has been studied in several previous studies. Many justifications and evidence on continuance intention have been provided, showing its relationships with various predictors. Mostly, continuance intention in technology adoption is linked with established theories or models such as TAM, TPB, UTAUT, or UTAUT2. Even though this study focuses on technology adoption, octalysis gamification was selected to be employed instead of those models. The game elements are considered relevant to be applied in this non-game context, as suggested by previous researchers. To provide more comprehensive insight into the mobile payment domain, this study uses attitude towards M-payment and perceived enjoyment as the mediators. This is because the existence of these two variables in technology adoption appears to be compulsory. Furthermore, the MTA framework also has a crucial role and relevance towards these relationships. Hence, the researcher is interested in bridging the gaps by identifying the relationships between the core drivers of octalysis gamification and continuance intention, moderated by mindfulness elements through attitude towards M-payment and perceived enjoyment. This study is conducted in the perspective of mobile payment adoption among Malaysian users during the post-endemic phase of Covid-19.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Introduction

The relationships between gamification components and M-payment continuance intention are assessed in this study. Subsequently, the mediating roles of attitude towards M-payment and perceived enjoyment are evaluated, along with the moderating role of mindfulness, which is conceived as a second-order construct in this study. To perform the assessment, the researcher proposes the methodology and approach of the study in this chapter. The discussion begins with the research design, data collection, and sources, followed by the sampling design and data collection method. This is then extended to the instrument, its validity and reliability, and finally, the procedures of data analysis.

3.2 Research Design

Stated by Kumar (1999), for a researcher to achieve a logical, square, and unbiased answer to research questions, research design is used. It is a particular plan on what tasks are needed to accomplish this research, the tools to measure and gather data, the assessment of the concern of the study, sample choice, and hypotheses testing (Thyer, 1993). Research design also includes the first-hand data, questions for the research, and final assumptions (Yin, 2002). It demonstrates the whole arrangement for this study, the structure of investigation, and the procedures of data selection to gather and assess. Therefore, the researcher could generate findings from the relationships between variables. The research type for this study is correlational research.

As it is more scientific, a quantitative approach is selected for this research. It involves a large sample size that represents the population. The cross-sectional survey design was considered appropriate for this study because it enables the collection of data from a large number of respondents at a single point in time and facilitates the examination of relationships among the proposed constructs within the structural model. While this design is suitable for testing associations and evaluating the strength and significance of hypothesized relationships, it does not establish temporal precedence or control for all potential confounding factors. Therefore, the findings

should be interpreted as evidence of association rather than definitive causal relationships.

The data obtained from it will then be evaluated statistically. Specifically, this research is performed to evaluate the following:

a. Gamification core drivers' impact on attitude and perceived enjoyment in the context of mobile payment in Malaysia.
b. The mediating effects of attitude towards M-payment and perceived enjoyment on the relationship between gamification components and continuance intention in the context of mobile payment in Malaysia.
c. The moderating role of mindfulness towards the relationships between gamification and mediators in the context of mobile payment in Malaysia.

3.2.1 Unit of Analysis

The unit of analysis was employed to answer the research questions and achieve the research objectives. Individuals considered as mobile payment users who used QR-code terminals for mobile payment transactions were selected as the unit of analysis. These individuals had to be consumers in Central Klang Valley and aged 18 years old and above. In addition, they had to be users of QR-code-based mobile payment and familiar with this method. The number of QR-code scanning usages had to be more than five times a month or at least more than 30 times in total, which was considered from the emergence of QR-code-based mobile payment, especially after the endemic phase of Covid-19. It was assumed that these individuals were accustomed to mobile payment services and had a continuance intention to use the service to make transactions. Therefore, surveys from these individuals were regarded as accurate for data collection.

3.3 Data Collection Procedure

Data was collected to provide the researcher with the opportunity to gain a clearer view and a better understanding of the research issues. To complete the study, primary data was chosen as the source for data collection. Using the problem statements, research objectives, and research questions, the researcher employed a specific data collection procedure to obtain first-hand information from mobile payment users.

Data collection was conducted between October 2025 and January 2026 in various public locations within the Central Klang Valley, including shopping malls,

retail outlets, restaurants, and other commercial areas where QR-code mobile payment facilities were commonly available. Face-to-face survey administration was adopted to facilitate respondent screening and improve response quality.

For the survey, respondents were screened to ensure they met the criteria. The targeted individuals had to be users of mobile payment services who exclusively employed QR-code-based mobile payments. These respondents were selected from individuals who made purchases using QR-code terminal scanners. An information card displaying the brand logos of mainstream mobile payment service providers was provided to facilitate the survey process. The selected respondents were shown the information card and required to recognize any mobile payment providers, selecting one brand as the main reference while completing the questionnaire. To be eligible for participation, respondents had to be active users of QR-code-based mobile payment services and have prior experience using at least one of the selected mobile payment applications. Individuals who did not use mobile payment services, relied solely on cash or card payments, or were unable to identify a mobile payment provider were excluded from the study.

Sorensen (2019) indicated that QR-code-based mobile payment was the most frequently used method for payment transactions. Therefore, individuals using QR-code-based mobile payment were selected as respondents. Seven mobile payment providers namely Touch 'n Go E-wallet, Boost, GrabPay, Setel, Maybank2U/MAE, CIMB Clicks/OCTO, and Bank Islam Go app were chosen for the study. These providers had a large number of active users, extensive merchant networks, and reliable expertise and resources. Not only were they among the most downloaded apps in Malaysia, but some were also participants in initiatives such as the e-Tunai program from Budget 2020 (Wong, 2019), as well as the e-Belia Rahmah and RM100 e-Tunai programs, implemented in July 2023 and Q4 of 2023, respectively.

The e-Belia Rahmah program targeted youth aged 18 to 20 or full-time students at institutions of higher education (IPT). Meanwhile, the RM100 e-Tunai program targeted all Malaysians aged 21 and above with an annual income of RM100,000 or less, which included individuals from the B40 and M40 income groups (Yin, 2023). These programs were assumed to encourage the use of QR-code-based mobile payments in Malaysia. Conducting the survey was made easier by the increasing adoption of QR-code-based mobile payments. Nevertheless, individuals who used QR-code-based

mobile payments but were not part of these incentive programs were also considered eligible respondents for this study.

To ensure data quality, incomplete questionnaires and responses with substantial missing data were excluded from the final analysis. As the survey was administered face-to-face and each respondent completed the questionnaire only once under the researcher's supervision, the possibility of duplicate responses was minimized. The distribution of questionnaires was carried out in the Central Klang Valley area due to its high population density and ease of access, making it more efficient to obtain information related to the study. In addition, the Central Klang Valley is among the most urbanized and digitally connected regions in Malaysia, characterized by high smartphone penetration, extensive QR-code merchant coverage, and widespread adoption of mobile payment services. Therefore, the area provided access to a sufficient number of experienced mobile payment users who met the study requirements.

Table 3.1
Most Used Mobile Payment in Malaysia

E-wallet	Logo
Touch n Go	
Boost	
GrabPay	
Setel	
Maybank2U / MAE	
Cimb Click / OCTO	

3.4 Sampling Design

The scientific method was employed by the researcher. Specifically, a sampling design was implemented to obtain a representative sample from the population. The characteristics of the selected population were used to determine the most appropriate sampling technique.

3.4.1 Target Population

Population is the whole set of individuals, issues of interest, or events desired by the researcher to identify. Population is portrayed as the sample that has similarities with certain assigned purposes (Sekaran, 2010). Central Klang Valley was selected for this study primarily because it has the highest population concentration in Malaysia (Rashid et al., 2014). Compared to other parts of Malaysia, almost every store in Central Klang Valley offers mobile payment services. Additionally, users in this area demonstrate positive attitudes and active participation in mobile payment usage. Therefore, Central Klang Valley was deemed the most suitable location to represent the population for this study.

3.4.2 Sample Size

According to Bougie and Sekaran (2010), the sample size is a part of the whole population size. The rule of thumb states that the valid lowest limit for a sample size is 30 respondents, whereas the valid highest limit of sample size is 500 respondents. For better sampling, the sample size must be precise and accurate to obtain the right data (Salkin, 2003). The minimum sample size requirement was analyzed and determined using the G*Power software application.

In addition to the G*Power application, researchers have access to several other methods for determining sample size. For instance, a sample size calculator often requires input parameters such as the desired power, effect size, and significance level. Researchers may also set their sample size based on previous studies and literature,

which provide insights into typical sample sizes used in the domain. Some researchers refer to Krejcie and Morgan, who developed a table using a sample size formula for finite populations. Additionally, the formula proposed by Johnson and Orme: N = (500 × c) / (a × t) can also be applied. However, these methods may not be suitable due to issues such as relevance, potential bias, or validation concerns.

Furthermore, the comprehensive statistical support, ability to address limitations of other methods, emphasis on statistical power, accessibility, and widespread adoption make G*Power a preferred tool for determining appropriate sample sizes in PLS-SEM research. Following the settings proposed by Vidaver-Cohen (1998), the effect size was set at $f^2 = 0.15$, Type I error rate at $\alpha = 0.05$, and Type II error rate at $\beta = 0.95$. For 12 predictors, the minimum required sample size was 184. To ensure adequate representation and avoid incomplete responses, the study targeted at least 250 respondents. The final data set exceeded this target, resulting in 426 usable responses.

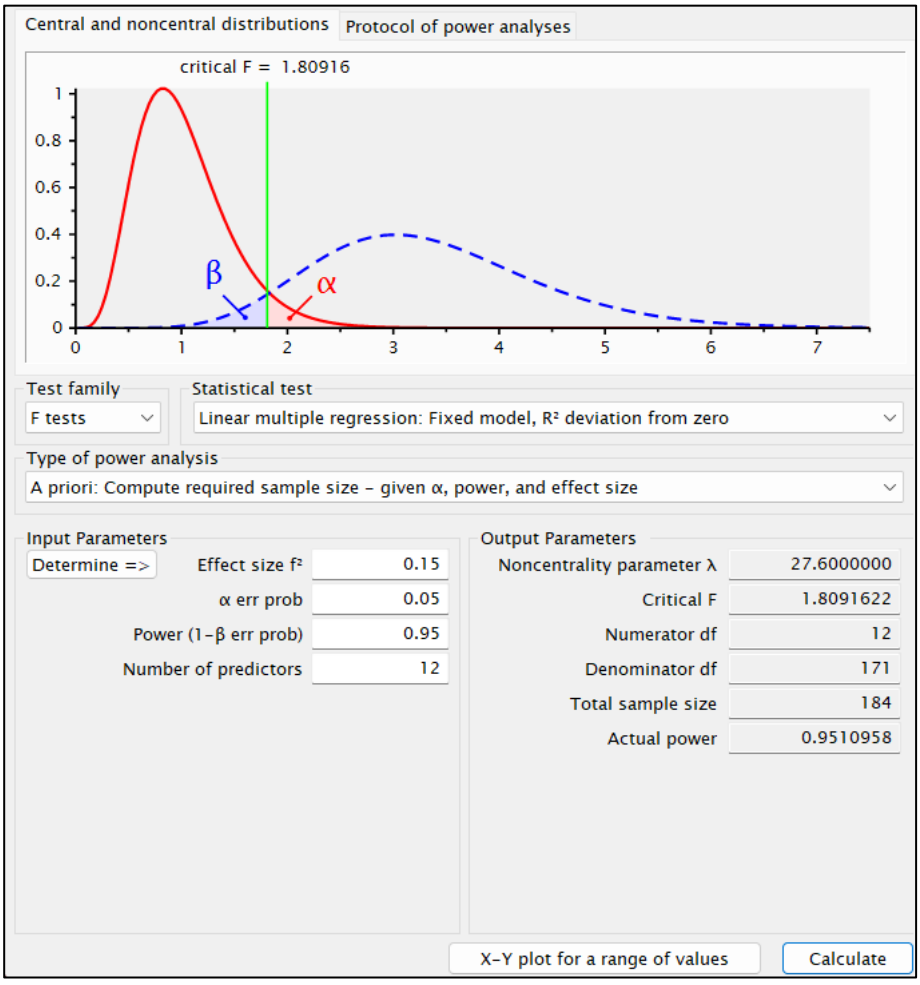

Figure 3.1 G*Power Analysis

3.4.3 Sampling Frame

The researcher does not typically have direct access to the entire target population. Instead, they rely on lists or tools to represent a subset of the population from which a sample can be drawn. This subset is referred to as the sampling frame. Sources for a sampling frame may include student email lists, membership directories, association directories, telephone books, and similar resources. However, if the elements of the sample are not accurately represented within the sampling frame, sampling frame errors may occur. Respondents are typically selected based on standard characteristics such as demographic traits (Malhotra, 2010). In this research, no sampling frame was available, making probability sampling unfeasible.

A sampling frame was not available for this research due to the nature of the target population and the specific context of the study. The target population consisted of mobile payment users who employed QR-code-based payment systems in the Central Klang Valley area. This group did not have an established or comprehensive list, directory, or database that could serve as a sampling frame. Unlike populations associated with institutions, memberships, or organizations where contact information is systematically maintained, mobile payment users are a dispersed group with no centralized registry. Furthermore, privacy concerns and data protection regulations restrict access to user information from mobile payment service providers, making it challenging to create or obtain a reliable sampling frame (Malhotra, 2010). As a result, the absence of an appropriate sampling frame necessitated the use of non-probability sampling methods for this study.

3.4.4 Sampling Technique

Sampling techniques are categorized into two main types: probability sampling and non-probability sampling. Within probability sampling, restricted methods include stratified sampling, cluster sampling, systematic sampling, area sampling, and multi-stage sampling. In contrast, unrestricted sampling involves simple random sampling (Sekaran & Bougie, 2010). For non-probability sampling, researchers are presented with four options: convenience sampling, purposive sampling, quota sampling, and snowball sampling.

Specifically, the researcher adopted the purposive sampling technique. This method is particularly effective when only a limited number of individuals in a population meet the specific criteria of interest. Purposive sampling is also referred to as selective sampling, subjective sampling, or judgmental sampling. It involves selecting respondents based on the researcher's judgment and knowledge. Given that the researcher's expertise serves as the instrument for identifying the sample, the findings are likely to be accurate and precise, with a minimal margin of error (Fleetwood, 2024).

Purposive sampling was deemed suitable for this study because the target population consisted of mobile payment users who utilized QR-code-based payment systems in the Central Klang Valley area. Identifying such individuals required the researcher to apply specific criteria. The absence of a sampling frame further justified the use of purposive sampling, as it enabled the researcher to directly select respondents who met the study's requirements without relying on an unavailable list or directory. During fieldwork, eligible respondents were identified through a screening process conducted prior to questionnaire administration. The researcher approached individuals who had just completed purchases using QR-code payment terminals at participating locations. To verify eligibility, respondents were asked whether they actively used mobile payment services and whether QR-code-based mobile payment was their primary payment method. Only individuals who satisfied these screening criteria were invited to participate in the face-to-face survey. Accordingly, the questionnaires were disseminated to individuals identified as mobile payment users.

Although purposive sampling was appropriate for identifying respondents who met the specific study criteria, it is a non-probability sampling technique and therefore limits the generalisability of the findings. Since respondents were selected based on predefined criteria rather than random selection, the results may not fully represent all mobile payment users in Malaysia. Consequently, the findings should be interpreted within the context of QR-code mobile payment users who share characteristics similar to the study sample. Therefore, the researcher selected:

1. Users who visited notable stores providing mobile payment services in the Central Klang Valley.
2. Users who conducted transactions over the counter.

3.5 Instrument

For the purpose of gathering data, the survey was conducted using questions in both English and Malay. The main aim was to make it easier and quicker for respondents, especially those who were less fluent in English, to answer the questionnaire. The data collection process was carried out using a face-to-face method.

To ensure the accuracy of the translated instruments, this study employed forward translation and back translation techniques. The instrument was first translated from English to Malay by qualified translators (forward translation). It was then translated back into English by a different translator who had not been involved with the original instrument (back translation). The primary aim of back translation was to identify any differences between the original items and the back-translated version (Bai et al., 2020).

Experts in Malay and English from the Academy of Language Studies and the Faculty of Business and Management at Universiti Teknologi MARA (UiTM) were chosen to handle the translation process. First, one bilingual translator translated the questionnaire from English (the source language) into Malay (the target language). Then, another bilingual translator independently translated it back from Malay into English. To ensure the meaning stayed consistent, the original and back-translated versions were compared, and no major differences were found. Once the experts confirmed the translations were accurate, the final versions of the questionnaires were prepared for pre-testing. The questionnaires were included in the appendix.

Additionally, pilot testing was used as a supplementary technique to refine the instrument. Respondents provided feedback on any content they found complicated, difficult, or potentially provocative. Pilot testing was also employed to analyze the process, clarity, and cultural appropriateness of the items (Bai et al., 2020).

3.5.1 Instrument Structure

The questionnaire was designed to reflect the significance of continuance intention in mobile payment usage, with questions aligned to the research objectives. It was structured to collect data by presenting specific questions that allowed respondents to provide their answers.

In this study, all items were adopted from prior research, except for those in Section H (Marker Variable). Three items in the Marker Variable section were adapted

from Miller and Simmering (2023). To identify bias in the study, a theoretically unrelated scale was included in the questionnaire (Lindell & Whitney, 2001). Section H comprised the following items:

i. Blue 1: I prefer the colour blue.
ii. Blue 2: I do not like the colour blue.
iii. Blue 3: I like wearing blue clothes.

In this technique, unrelated questions irrelevant to the variables of interest were used to identify relationships between other variables and the marker variable. This approach assessed the presence and magnitude of method bias (Bai et al., 2020).

Table 3.2
Instrument Design

Section	Variables	Number of Questions	Sources
B	Meaning	4	Brito et al. (2018); Li et al. (2021)
C	Development	4	Brito et al. (2018); Gómez-Cambronero et al. (2023)
D	Ownership	4	Brito et al. (2018)
E	Social influence	4	Brito et al. (2018)
F	Unpredictability	4	Acikgoz et al. (2023); Brito et al. (2018)
G	Avoidance	4	Brito et al. (2018)
H	Marker Variable	3	Miller and Simmering (2023)
I	Attitude towards M-payment	4	Wong et al. (2022)
J	Perceived enjoyment	4	Giovannini et al. (2015)
K	Engagement with technology	4	Flavian et al. (2020)
L	Technological novelty seeking	4	Flavian et al. (2020)
M	Awareness of local context	4	Flavian et al. (2020)
N	Cognizance of alternative technologies	4	Flavian et al. (2020)
O	M-payment Continuance intention	4	Akdim et al. (2022); Hsieh (2021)

3.5.2 Measurement and Scaling

For Section A, nominal and ordinal scales were applied to certain questions accordingly. As referred to by Sekaran (2010), a nominal scale cannot be measured or scaled numerically, but it enables the researcher to categorize subjects into different groups. In contrast, certain parts that require measurement and scaling employed an

ordinal scale. Examples of nominal scale include gender or the race of respondents. Categories such as male, female, Malay, Chinese, and Indian cannot be measured quantitatively. Meanwhile, the ordinal scale involves variables that can be measured, such as household income in the demographic section. Using household income, the researcher determined whether respondents belonged to B40, M40, or T20 income groups.

From Section B to Section O, a 5-point Likert scale was employed as the primary measurement tool. The Likert scale was considered appropriate due to its ability to capture respondents' attitudes, perceptions, and behaviors effectively (Likert, 1932). This scaling method provided a consistent framework for evaluating various constructs across multiple sections.

Specifically, the 5-point Likert scale was applied to Section B (meaning), Section C (development), Section D (ownership), Section E (social influence), Section F (unpredictability), Section G (avoidance), Section H (marker variable), Section I (attitude towards mobile payment), Section J (perceived enjoyment), Section K (engagement with technology), Section L (technological novelty seeking), Section M (awareness of local context), Section N (cognizance of alternative technologies), and Section O (continuance intention). Each section addressed distinct aspects of the research objectives, ensuring a comprehensive understanding of the variables under study.

The scale ranged from 1 (strongly disagree) to 5 (strongly agree), enabling respondents to express varying degrees of agreement or disagreement. This approach facilitated nuanced responses, provided meaningful insights into the participants' perspectives, and allowed for quantitative analysis of complex constructs. The use of a 5-point scale also maintained simplicity and consistency, making it easier for respondents to provide accurate answers and enhancing the reliability and validity of the collected data (Vagias, 2006).

3.6 Validity and Reliability of Instrument

Referring to Bolarinwa (2016), the reliability of an instrument is the significance of measuring its consistency, whereas validity measures the accuracy of the instrument. Both validity and reliability of instruments are crucial in determining whether the

survey can be carried out effectively. Composite reliability and Cronbach's alpha were referred to in measuring the reliability of the instrument.

Composite reliability (CR) is an important measure used to check how well the items in a questionnaire work together to represent a specific concept or construct. It helps researchers understand whether the items are consistent and reliable. The rule of thumb for CR is equal to or greater than 0.7 (Gefen et al., 2000). CR was calculated by examining how strongly each item relates to the concept being measured and the extent of error present in the responses. This process helps ensure that the questionnaire items are clear and accurately reflect the intended concept. CR provides researchers with confidence that their tool is reliable and suitable for use in their studies (Hair et al., 2019).

Next, Cronbach's alpha was used. The researcher determined whether the items could be accepted based on this method. If the value was below 0.60, it was regarded as poor; values from 0.60 to less than 0.70 indicated the items could be accepted. Values from 0.70 to less than 0.80 were considered good, values from 0.80 to less than 0.90 were considered very good, and values of 0.90 and above indicated that the strength of association was excellent (Sekaran, 2010).

Table 3.3
Rule of Thumbs Cronbach's Alpha Coefficient Size

Alpha Coefficient Range	Strength of Association
Less than 0.6	Poor
0.6 to <0.7	Moderate
0.7 to <0.8	Good
0.8 to <0.9	Very Good
0.9 and above	Excellent

3.6.1 Pre-Test

The process of survey development involves several steps including pre-testing questionnaires. The reliability and validity of testimonial survey evidence can be strengthened by conducting a pre-test. During the process, the researcher must focus on the respondents' reactions when they are answering the questions since the respondents may experience different processes during completing the questionnaires. It is important to make sure the respondents answer and interpret the questions in the way of the research intended. The aim to perform a pre-test is to obtain the information the questions required, identify whether the respondents are able to do the task as well as

determine the questions are understandable or not. This process offers concrete evidence for the validity of the questionnaires (Berry, 2000). Furthermore, the issues regarding the choice of wording also can be acknowledged (Stockemer, 2019). Pretesting the questionnaires allows the researcher to improve the survey by removing analytical errors (Hashim et al., 2022). Therefore, this study chose to perform a pre-test to ensure the validity and reliability of survey questionnaires.

The questionnaires of this research are measured by employing face and content validity:

3.6.1.1 Pre-test with Expert

Content validity is used to check the items accurately reflects the full scope of the concept it aims to measure. It involves evaluating whether all important aspects of the subject are included while avoiding irrelevant content. Experts in the field typically assess this validity to confirm that the test is comprehensive and aligned with the intended purpose.

The researcher sent a questionnaire validation form to four experts from different universities. The form included a checklist of the measurement items, the study's conceptual framework, operational definitions, and the original items. The experts were also informed about the research objectives. They were tasked with evaluating the constructs using adapted instruments, which had been simplified due to (1) lengthy wording, (2) excessive items, and (3) ambiguity. Each survey instrument was clearly labelled as either originally adapted or modified. For modified instruments, references to the original versions were provided in the appendix. The experts reviewed each item and rated it whether as a perfect match, moderate match, or poor match. For items rated as a moderate match, they have suggested more appropriate wording in the comments section.

The waiting time for feedback was approximately 1–2 weeks. Out of the four experts, feedback was successfully obtained from Dr. Azwan Shah Aminuddin (Universiti Teknologi MARA), Dr. Khalid Farooq (Universiti Malaysia Terengganu), and Dr. Diana Emang (Universiti Putra Malaysia). The experts were selected based on their academic expertise in technology adoption, consumer behaviour, quantitative research methods, and experience in instrument validation. Although the questionnaire validation form was also sent to a fourth expert, no feedback was received within the

allocated review period despite follow-up communication. Therefore, only the feedback obtained from the three responding experts was included in the content validation process. After analyzing their comments, one new item was added to the section on engagement with technology, awareness of the local context, and technological novelty-seeking. Minor corrections, including spelling, grammar, and ambiguity, were also identified. All items were revised based on the experts' feedback. The revisions primarily involved rewording several items to improve clarity, readability, and reduce ambiguity. No measurement items were removed prior to the pilot study or main data collection..

3.6.1.2 Pre-test with Respondents

From the perspective of face validity, prospective respondents who were considered relevant to the study had been selected by the researcher to discuss the questionnaires.

Six respondents who met the characteristics defined in the unit of analysis were selected for the pre-test. According to Perneger et al. (2014), involving 5 to 15 respondents in pre-testing was acceptable for studies with large-scale samples. The pre-test was conducted using a cognitive interview approach, where respondents were asked to share their thoughts after completing the questionnaires. They provided feedback on the format, wording, order, and clarity of the questions. On average, respondents took 10–15 minutes to complete the questionnaires and reported that they found them easy to understand. Only minor adjustments were made based on their feedback and the information obtained were used to correct and improvise the items in questionnaires before the distribution.

3.6.2 Pilot Study

A pilot study is a small-scale preliminary investigation conducted to test the feasibility, design, and methodology of a larger research project. It helps identify potential issues and refine tools or procedures, reducing risks in the main study (Leon, Davis, & Kraemer, 2011). Pilot study for this study was planned to be completed within three weeks, targeting 100 prospective respondents, which was considered a sufficient sample size for such studies (Hair et al., 2010b). These respondents must meet the characteristics defined in the unit of analysis, namely active users of QR-code-based

mobile payment services. However, data collection took longer than expected, and 110 completed and usable questionnaires were collected over a month and a half.

This research employed SmartPLS 3.0 to analyze the findings. PLS-SEM was used to assess the validity and reliability of the 52 items in the pilot test questionnaire. Evaluating the instrument's quality was essential to confirm that it was both valid and reliable. The scale used in this study was well-established and adapted from previous research, thus, confirmatory composite analysis (CCA) was conducted to verify whether the measurement items and their functions remained consistent over time (Boateng et al., 2018).

Internal consistency (reliability), convergent validity (indicator loadings and average variance extracted), and discriminant validity for reflective indicators were the primary measurements used in the pilot study (Hair et al., 2017). The data analysis was conducted using PLS-SEM, a process referred to as confirmatory composite analysis (Hair et al., 2017; Henseler, 2017; Hair et al., 2014). Table 3.4 below presents the indicator loadings, composite reliability (CR), and average variance extracted (AVE) for the reflective constructs.

Table 3.4
Summary of Pilot Study' Result

Construct	**Items**	**Convergent validity**		**Internal consistency reliability**		**Discriminant validity**
		Outer loadings	**AVE > 0.5**	**Cronbach alpha**	**CR > 0.7**	**HTMT > 0.85 / < 1**
Meaning	MN1	0.711	0.576	0.755	0.844	YES
	MN2	0.750				
	MN3	0.804				
	MN4	0.767				
Development	DV1	0.795	0.685	0.849	0.897	YES
	DV2	0.887				
	DV3	0.817				
	DV4	0.808				
Ownership	OW1	0.747	0.702	0.856	0.904	YES
	OW2	0.879				
	OW3	0.859				
	OW4	0.859				
Social Influence	SI1	0.787	0.624	0.798	0.868	YES
	SI2	0.740				
	SI3	0.761				
	SI4	0.865				
Unpredictability	UP1	0.897	0.800	0.917	0.941	YES
	UP2	0.885				
	UP3	0.901				
	UP4	0.895				
Avoidance	AV1	0.868	0.791	0.912	0.938	YES
	AV2	0.885				

Construct	Items	Convergent validity		Internal consistency reliability		Discriminant validity
		Outer loadings	AVE > 0.5	Cronbach alpha	CR > 0.7	HTMT > 0.85 / < 1
	AV3	0.904				
	AV4	0.900				
Attitude towards M-payment	ATT1	0.864	0.796	0.915	0.940	YES
	ATT2	0.907				
	ATT3	0.921				
	ATT4	0.876				
Perceived enjoyment	PE1	0.874	0.829	0.931	0.951	YES
	PE2	0.939				
	PE3	0.955				
	PE4	0.872				
Engagement with technology	ET1	0.859	0.738	0.882	0.918	YES
	ET2	0.849				
	ET3	0.892				
	ET4	0.835				
Technology novelty seeking	TN1	0.880	0.764	0.897	0.928	YES
	TN2	0.908				
	TN3	0.870				
	TN4	0.837				
Awareness of local context	AL1	0.839	0.756	0.892	0.925	YES
	AL2	0.886				
	AL3	0.920				
	AL4	0.829				
Cognizance of alternative technology	CA1	0.768	0.637	0.809	0.875	YES
	CA2	0.819				
	CA3	0.859				
	CA4	0.740				
M-payment continuance intention	MCI1	0.844	0.798	0.915	0.940	YES
	MCI2	0.926				
	MCI3	0.883				
	MCI4	0.917				

Cronbach's alpha values for the independent variables ranged from 0.755 to 0.917. Among these, meaning and social influence demonstrated moderate internal consistency, while development and ownership exhibited very good internal consistency. Unpredictability and avoidance showed excellent strength of association. Both mediators demonstrated excellent internal consistency, with attitude towards m-payment scoring 0.915 and perceived enjoyment scoring 0.931. Similarly, the moderating variables had Cronbach's alpha values between 0.809 and 0.897, indicating very good internal consistency. The dependent variable, m-payment continuance intention, achieved a Cronbach's alpha of 0.915, reflecting excellent strength of association.

In terms of composite reliability (CR), the results of this study showed that all components exceeded the threshold value of 0.7 (Gefen et al., 2000), with a range from 0.844 to 0.951, further supporting the reliability indicated by Cronbach's alpha. Both

CR and Cronbach's alpha confirmed that the items were sufficiently correlated and consistently represented the intended constructs, with the CR providing additional evidence of internal consistency reliability.

Indicators with outer loadings between 0.40 and 0.70 were considered for removal only if their exclusion improved composite reliability or average variance extracted (AVE). However, in pilot study, all items exceeded the threshold, with outer loadings ranging from 0.711 to 0.955, confirming their adequacy for the model. Hence, all items were retained for actual distribution.

Furthermore, all constructs in pilot study met the recommended threshold for AVE, with values ranging from 0.544 to 0.805. These results confirmed that each construct demonstrated a satisfactory level of convergent validity, as the AVE values exceeded the minimum criterion of 0.50.

Based on the results, all computed values satisfied the criteria. The HTMT inference analysis revealed that none of the confidence intervals for the constructs included the value of 1, providing additional confirmation of discriminant validity. Furthermore, all indicator loadings were higher on their assigned constructs and lower on other constructs. This pattern confirmed that discriminant validity was achieved, indicating that the constructs were conceptually and empirically distinct.

Table 3.5
Cross Loading - Pilot Study

Construct/ Items	Attitude towards M-payment	Avoidance	Awareness of local context	Cognizance of alternative technology	Development	Engagement with technology	M-payment continuance intention	Meaning	Ownership	Perceived enjoyment	Social influence	Technological novelty seeking	Unpredictability
AL1	0.559	0.477	0.839	0.601	0.447	0.618	0.389	0.300	0.434	0.597	0.481	0.736	0.505
AL2	0.435	0.487	0.886	0.585	0.516	0.607	0.341	0.333	0.440	0.609	0.392	0.520	0.426
AL3	0.435	0.464	0.920	0.677	0.521	0.601	0.360	0.433	0.439	0.550	0.360	0.516	0.412
AL4	0.422	0.480	0.829	0.554	0.470	0.489	0.344	0.441	0.423	0.502	0.448	0.365	0.415
ATT1	0.864	0.371	0.428	0.470	0.266	0.379	0.519	0.299	0.308	0.448	0.507	0.502	0.474
ATT2	0.907	0.321	0.522	0.581	0.304	0.520	0.671	0.365	0.339	0.593	0.503	0.560	0.347
ATT3	0.921	0.424	0.532	0.567	0.326	0.461	0.570	0.424	0.405	0.604	0.552	0.567	0.421
ATT4	0.876	0.162	0.423	0.498	0.134	0.395	0.621	0.245	0.246	0.433	0.431	0.550	0.257
AV1	0.329	0.868	0.503	0.553	0.682	0.534	0.283	0.399	0.632	0.465	0.412	0.371	0.766
AV2	0.253	0.885	0.456	0.515	0.638	0.519	0.163	0.288	0.606	0.413	0.438	0.350	0.652
AV3	0.304	0.904	0.435	0.490	0.561	0.472	0.148	0.250	0.530	0.467	0.446	0.367	0.616
AV4	0.366	0.900	0.540	0.552	0.659	0.538	0.221	0.307	0.603	0.523	0.388	0.457	0.659
CA1	0.425	0.631	0.681	0.768	0.520	0.535	0.337	0.450	0.509	0.537	0.412	0.474	0.539
CA2	0.482	0.388	0.519	0.819	0.432	0.505	0.536	0.390	0.391	0.440	0.334	0.401	0.431
CA3	0.463	0.485	0.518	0.859	0.518	0.570	0.515	0.379	0.427	0.564	0.340	0.509	0.492
CA4	0.516	0.392	0.502	0.740	0.500	0.651	0.397	0.225	0.440	0.484	0.377	0.908	0.425
DV1	0.315	0.429	0.458	0.498	0.795	0.437	0.309	0.470	0.495	0.520	0.415	0.435	0.450
DV2	0.234	0.648	0.434	0.564	0.887	0.547	0.252	0.481	0.711	0.514	0.392	0.518	0.551

Construct/ Items	Attitude towards M-payment	Avoidance	Awareness of local context	Cognizance of alternative technology	Development	Engagement with technology	M-payment continuance intention	Meaning	Ownership	Perceived enjoyment	Social influence	Technological novelty seeking	Unpredictability
DV3	0.121	0.692	0.445	0.501	0.817	0.451	0.102	0.331	0.638	0.395	0.289	0.355	0.591
DV4	0.243	0.662	0.527	0.490	0.808	0.472	0.160	0.400	0.628	0.433	0.265	0.413	0.601
ET1	0.298	0.495	0.500	0.575	0.477	0.859	0.284	0.303	0.424	0.582	0.368	0.450	0.444
ET2	0.327	0.514	0.517	0.568	0.489	0.849	0.288	0.364	0.438	0.563	0.355	0.469	0.471
ET3	0.496	0.501	0.632	0.651	0.536	0.892	0.469	0.271	0.394	0.610	0.433	0.656	0.482
ET4	0.544	0.490	0.633	0.659	0.479	0.835	0.403	0.282	0.414	0.632	0.482	0.704	0.449
MCI1	0.607	0.161	0.377	0.501	0.183	0.308	0.844	0.337	0.248	0.358	0.383	0.431	0.297
MCI2	0.685	0.250	0.446	0.578	0.277	0.494	0.926	0.348	0.304	0.495	0.486	0.504	0.350
MCI3	0.558	0.241	0.345	0.437	0.258	0.334	0.883	0.422	0.255	0.410	0.395	0.282	0.296
MCI4	0.526	0.176	0.293	0.459	0.227	0.376	0.917	0.357	0.227	0.395	0.403	0.323	0.294
MN1	0.256	0.161	0.297	0.255	0.315	0.132	0.286	0.711	0.297	0.224	0.273	0.177	0.169
MN2	0.322	0.365	0.328	0.368	0.355	0.281	0.234	0.750	0.454	0.371	0.439	0.304	0.290
MN3	0.316	0.135	0.310	0.306	0.308	0.283	0.424	0.804	0.441	0.325	0.326	0.228	0.210
MN4	0.240	0.409	0.369	0.423	0.602	0.349	0.281	0.767	0.378	0.414	0.353	0.190	0.449
OW1	0.343	0.318	0.375	0.437	0.478	0.341	0.300	0.552	0.747	0.308	0.332	0.399	0.320
OW2	0.323	0.627	0.362	0.466	0.672	0.394	0.259	0.340	0.879	0.349	0.416	0.447	0.609
OW3	0.260	0.643	0.414	0.438	0.660	0.450	0.194	0.429	0.859	0.382	0.489	0.423	0.609
OW4	0.288	0.654	0.521	0.521	0.668	0.440	0.217	0.425	0.859	0.390	0.421	0.459	0.625
PE1	0.467	0.339	0.537	0.542	0.475	0.574	0.398	0.377	0.312	0.874	0.391	0.470	0.331
PE2	0.556	0.546	0.676	0.611	0.560	0.637	0.427	0.415	0.418	0.939	0.457	0.514	0.441

Construct/ Items	Attitude towards M-payment	Avoidance	Awareness of local context	Cognizance of alternative technology	Development	Engagement with technology	M-payment continuance intention	Meaning	Ownership	Perceived enjoyment	Social influence	Technological novelty seeking	Unpredictability
PE3	0.546	0.551	0.603	0.595	0.576	0.632	0.393	0.421	0.446	0.955	0.476	0.496	0.493
PE4	0.558	0.477	0.554	0.572	0.475	0.689	0.479	0.404	0.371	0.872	0.440	0.465	0.462
SI1	0.492	0.295	0.404	0.276	0.212	0.334	0.318	0.366	0.354	0.371	0.787	0.273	0.314
SI2	0.436	0.042	0.154	0.141	0.061	0.239	0.321	0.260	0.163	0.254	0.740	0.277	0.139
SI3	0.335	0.517	0.389	0.439	0.486	0.419	0.337	0.379	0.437	0.413	0.761	0.349	0.497
SI4	0.490	0.569	0.526	0.549	0.523	0.499	0.482	0.430	0.555	0.471	0.865	0.476	0.625
TN1	0.542	0.358	0.466	0.630	0.439	0.529	0.375	0.259	0.478	0.345	0.374	0.880	0.434
TN2	0.516	0.392	0.502	0.740	0.500	0.651	0.397	0.225	0.440	0.484	0.377	0.908	0.425
TN3	0.514	0.302	0.561	0.590	0.420	0.589	0.347	0.273	0.449	0.455	0.361	0.870	0.284
TN4	0.566	0.475	0.654	0.628	0.487	0.581	0.410	0.284	0.442	0.574	0.439	0.837	0.516
UP1	0.384	0.754	0.501	0.534	0.574	0.485	0.253	0.271	0.560	0.432	0.488	0.394	0.897
UP2	0.383	0.580	0.388	0.480	0.483	0.396	0.401	0.323	0.542	0.330	0.509	0.406	0.885
UP3	0.274	0.742	0.429	0.511	0.689	0.499	0.207	0.356	0.618	0.486	0.424	0.374	0.901
UP4	0.432	0.652	0.490	0.587	0.594	0.536	0.367	0.374	0.588	0.458	0.436	0.510	0.895

3.7 Ethical Consideration

This study was conducted in accordance with the ethical principles and guidelines governing research involving human participants. Prior to data collection, ethical approval was obtained from the UiTM Research Ethics Committee (REC). The research proposal entitled “Predicting M-Payment Continuance Intention Through Gamification: The Moderating Roles of Mindfulness” was approved under reference number REC/10/2025 (PG/MR/551). The authorized personnel involved in this research were the researcher and the appointed supervisor, Assoc. Prof. Dr Muhammad Iskandar Hamzah.

Before participating in the survey, respondents were provided with an informed consent statement explaining the purpose of the research, the procedures involved, and their rights as participants. Respondents were informed that participation was entirely voluntary and that they could choose whether to participate or discontinue completing the questionnaire at any stage without any consequences. The anonymity and confidentiality of respondents were maintained throughout the research process. No personally identifiable information, such as names or identification details, was collected from respondents. All responses were treated confidentially and were used solely for academic purposes. The findings were presented in an aggregated form to ensure that individual respondents could not be identified.

The collected research data were securely stored and managed by the researcher. Access to the raw dataset was restricted to the researcher and authorised academic personnel for research supervision, verification, and academic purposes. The data will be retained and disposed of according to the applicable institutional research data management requirements. This study involved minimal risk to participants as it employed a questionnaire-based survey focusing on respondents’ perceptions, experiences, and behavioural intentions regarding mobile payment usage. No sensitive personal information was collected, and appropriate measures were implemented to safeguard participants’ privacy, confidentiality, and welfare throughout the research process.

3.8 Data Analysis

The data analysis process in this study involved an interactive and systematic approach to assess, organize, and evaluate all necessary elements. The data collected

through the questionnaires were meticulously analyzed step by step to ensure accuracy and reliability.

The latest version of the Statistical Package for Social Sciences (SPSS) software was utilized at specific stages, including data screening, normality testing, and identifying any missing values. These preliminary steps ensured the dataset was clean and met the requirements for further analysis.

Subsequently, SMART-PLS software was employed to perform the remaining stages of data analysis. This tool was particularly suited for assessing complex models and relationships, making it ideal for examining the constructs and hypotheses in this study. Together, these analytical tools provided a comprehensive and robust approach to understanding the research findings.

3.8.1 Frequency Distribution

By analyzing the demographic data, the study provided an overview of the respondents' profiles, ensuring that the sample was relevant and representative for the research objectives. Understanding these characteristics helped establish the context of the study and supported the interpretation of the results. The use of SPSS for frequency analysis ensured accuracy and added credibility to the findings. This detailed examination of respondents' demographics was an essential part of the research, laying the groundwork for further analysis.

The analysis process began by entering the collected demographic data into the Statistical Package for Social Science (SPSS), which is a reliable tool for data analysis. Using SPSS, the researcher conducted a frequency analysis to calculate the number and percentage of respondents in each category. This allowed for the data to be presented in an organized and meaningful way, showing the distribution of respondents across different demographic groups

The demographic characteristics of the respondents, including gender, age, the frequency that are related m-payment usage were carefully analyzed to provide a clear and detailed understanding of the sample population. This analysis was carried out using frequency distribution, a statistical method used to determine the distribution of variables within the dataset. The frequency distribution helped organize the data, making it easier to identify patterns and trends among the respondents. The details of result were presented in the next chapter.

3.8.2 Descriptive Statistic

Descriptive statistics helped the researcher simplify the sample, enabling a clear understanding of the basic characteristics of the data in this study on mobile payment continuance intention. The large number of respondents was concisely summarized and interpreted using descriptive statistics. These statistics were employed to measure the means, standard deviation, and range. An interval scale or ratio scale was typically used to determine the mean values for these constructs, providing a foundational overview of the dataset.

3.8.3 Partial Least Square-Structural Equation Model (PLS-SEM)

Structural equation modelling or SEM is common and has been employed in many areas of studies. Researchers use SEM to analyze multivariate data and performing statistical analysis. Factor analysis, regression analysis and discriminant analysis are usually examined using this tool. SEM is based on theoretical constructs that are illustrated by latent factors, where the link between constructs is explained by regression or path coefficients between factors. Plus, SEM is employed to comprehend the structure between observed variables, the covariance structural modelling and it is often portrayed graphically using a path diagram (Hox and Bechger, 1998). Apparently, there are two general approaches of SEM namely Variance-based SEM (PLS-SEM) and Covariance-based SEM (CB-SEM) (Haenlein & Kaplan, 2004). They are commonly elucidated in a set of matrix equations, more complementary rather than competitive. PLS-SEM is to maximize the explained variance of endogenous and exogenous variables, in contrast, CB-SEM is employed in testing the fit between the theoretical and observed covariance matrix. There are several differences between these methods, demonstrated in table below. The table is based several different literature resources, Hsu et al. (2006), Henseler et al. (2009), Hair et al. (2011), and Hair et al. (2014).

Table 3.6
PLS-SEM vs CB-SEM

Criteria	PLS-SEM	CB-SEM
Research Objectives	Exploratory and confirmatory based on insufficient theoretical base	Strictly Confirmatory based on sufficient theoretical base
Research Purpose	Prediction by explaining the variance of key target constructs.	Theory testing by explaining the maximizing fit between the correlational matrix and parameter estimates.

Sample Size Consideration	Small (Minimum 20)	Large (Minimum 200-800)
Data Distribution Properties	None. Least assumptions about properties of normal distribution of data are required.	Multivariate normal data is required. Properties of normal distribution should be strictly met.
Model Specification	Both formative and reflective relationships can be used	Only reflective relationships can be used
Measurement Objectives	Flexible	Rigid
Hierarchical Latent Variable Scores	Determinate nature of factors so explicitly calculating unobserved variables estimate	Indeterminate nature of factors is considered

Based on the information above, PLS-SEM was more relevant to this study as it used for the explanation of variance, the prediction of variable relationship (Hair Jr. et al., 2021). Thus, PLS-SEM was adopted.

3.8.4 Discriminant Validity

Each construct in this study was treated as unique and distinct, with minimal correlation to other constructs. Confirming this distinctiveness through discriminant validity was essential in PLS-SEM to ensure that constructs measured different concepts. Discriminant validity was assessed using two main methods: the Heterotrait-Monotrait Ratio (HTMT) and cross-loadings. The HTMT ratio compares correlations between different constructs to detect any lack of discriminant validity. According to Henseler et al. (2015), HTMT values below the conservative threshold of 0.85 indicate sufficient distinctiveness, while values above 0.90 suggest potential overlap and validity concerns.

Cross-loadings were also examined to verify that each indicator loaded more strongly on its intended construct than on others. Indicators with loading differences less than 0.10 raised concerns about discriminant validity and were carefully reviewed or removed. In this study, these discriminant validity assessments were rigorously applied to confirm that each construct measured a unique aspect of mobile payment continuance intention. This validation strengthened the measurement model and enhanced the reliability and accuracy of the analysis, providing a solid foundation for understanding the factors influencing continued mobile payment use in the Malaysian context.

3.8.5 Plan of Data Analysis

The data analysis plan for this study was designed to thoroughly examine how gamification dimensions, user attitudes, perceived enjoyment, mindfulness, and the intention to continue using mobile payment (M-payment) services in Malaysia were related during the post-COVID-19 endemic phase.

The analysis began with Confirmatory Composite Analysis (CCA) to validate the measurement model. This step ensured that each factor was accurately measured by the survey items and confirmed the reliability and validity of the constructs. Establishing this foundation was essential before investigating their effects. Next, Partial Least Squares (PLS) analysis was used to analyze both direct and indirect relationships. Finally, structural modeling was applied to examined whether the strength or direction of the connections between gamification, attitude, perceived enjoyment, and continuance intention differed depending on users' mindfulness levels.

Table 3.7
Plan of Data Analysis

Research Objectives	Research Questions	Hypotheses	Constructs / Variables	Analysis Technique	Chapter / Section
RO1: To identify the impact of the Octalysis gamification factors on users' attitude and perceived enjoyment, and how these factors subsequently affect continuance intention in mobile payment services in Malaysia.	**RQ1:** Do Octalysis gamification factors have an impact on users' attitude and perceived enjoyment, which in turn affect their continuance intention towards mobile payment services in Malaysia?	H1a, H1b, H2a, H2b, H3a, H3b, H4a, H4b, H5a, H5b, H6a, H6b, H7, and H9	Meaning, Development, Ownership, Social Influence, Unpredictability, Avoidance, Attitude towards M-payment, Perceived Enjoyment, and M-payment Continuance Intention	Confirmatory Composite Analysis (CCA) and PLS-SEM Structural Model Assessment	Chapter 4 (Results) and Chapter 5 (Discussion)
RO2: To determine the mediating effect of attitude and perceived enjoyment among Malaysians in predicting continuance intention of QR-code-based mobile payments.	**RQ2:** Do attitude and perceived enjoyment have a mediating effect in predicting continuance intention of QR-code-based mobile payments?	H8a–H8f and H10a–H10f	Attitude towards M-payment and Perceived Enjoyment (Mediators), M-payment Continuance Intention	Mediation Analysis using Bootstrapping Procedure in PLS-SEM	Chapter 4 (Results) and Chapter 5 (Discussion)
RO3: To assess the moderating effect of mindfulness in predicting continuance intention of QR-code-based mobile payments in Malaysia.	**RQ3:** Does mindfulness have a moderating effect in predicting continuance intention of QR-code-based mobile payments in Malaysia?	H11a–H11f and H12a–H12f	Mindfulness (Moderator), Meaning, Development, Ownership, Social Influence, Unpredictability, Avoidance, and M-payment Continuance Intention	Moderation Analysis using Interaction Effects in PLS-SEM	Chapter 4 (Results) and Chapter 5 (Discussion)

3.8.5.1 Evaluation of Measurement Model

When developing a measurement model, researchers typically distinguish between two broad types: reflective and formative measurement models (Hair et al., 2011). This study adopted a reflective measurement model, which is grounded in classical test theory, a framework with a longstanding tradition in the social sciences. According to this theory, observed indicators are manifestations of an underlying latent construct; hence, changes in the construct are expected to be reflected in the indicators. Reflective indicators are considered interchangeable and are viewed as a representative sample drawn from the universe of items within the conceptual domain of the construct. As such, indicators associated with a specific construct should exhibit high intercorrelations (Hair et al., 2017).

To evaluate the reflective measurement model, Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to perform Confirmatory Composite Analysis (CCA). This analysis focused on three essential psychometric properties: internal consistency reliability, convergent validity, and discriminant validity. Internal consistency was assessed using Cronbach's alpha and composite reliability. Convergent validity was examined through the average variance extracted (AVE), which indicates the extent to which a construct explains the variance of its indicators. Discriminant validity was evaluated using the Heterotrait-Monotrait ratio of correlations (HTMT), a robust criterion for determining the distinctiveness of constructs within the model. Bootstrapping was employed to examine whether the HTMT values were significantly different from 1. Discriminant validity is confirmed when the 90% confidence interval of the HTMT does not include the value of 1, indicating that the constructs are statistically distinct from one another.

Table 3.8
Evaluation of Measurement Model

Assessment	**Name of Index**	**Guidelines**
Internal consistency reliability	Composite reliability (CR)	CR ≥ 0.7 (Gefen et al., 2000)
Indicator reliability	Outer loadings	Indicator's outer loadings ≥ 0.7 Indicator's outer loadings 0.4 – 0.7 is adequate if AVE achieved the suggested threshold value. (Ramayah et al., 2018)

Convergent validity	Average Variance Extracted (AVE)	AVE ≥ 0.5 (Bagozzi & Yi,1988; Fornell & Larcker, 1981)
Discriminant validity	HTMT Criterion	HTMT – 0.85 (Kline, 2011) HTMT – 0.9 (Gold et al, 2001)

3.8.5.2 Evaluation of Structural Model

Structural model is crucial in PLS-SEM, it determines the hypothesized relationship between variables and assess the model's predictive power. The structural model assessment ensures there is no multicollinearity among predictor constructs, evaluates the model's fit and validity, and examines mediating or moderating impact to increase the theoretical framework's robustness. According to Hair et al. (2021), to identify the strength and direction of relationship, assessment of path coefficient is required. Plus, the predictive accuracy that involve evaluating R^2 and Q^2 and the testing for statistical significance to confirm hypotheses. These analyses give empirical support for decision-making and guarantee the findings are both statistically reliable and theoretically meaningful, advancing the broader field of research (Sarstedt et al., 2017).

As all hypotheses proposed directional positive relationships, one-tailed significance tests were employed in evaluating the path coefficients. The significance of the path coefficients, mediating effects, and moderating effects was assessed using a bootstrapping procedure with 10,000 subsamples. This approach enabled the estimation of standard errors, t-values, p-values, and confidence intervals for hypothesis testing. In addition, the interpretation of structural relationships was based not only on statistical significance but also on effect sizes (f^2) to evaluate the practical importance of each predictor.

Table 3.9
Evaluation of Structural Model

Assessment	**Name of Index**	**Guidelines**
Lateral Collinearity	Variance Inflation Factor (VIF)	VIF ≤ 3.0 (Hair et al., 2022)
Path Coefficient	Path coefficient	p-value < 0.05 t-value > 1.96 (two-tailed) t-value > 1.645 (one-tailed) (Hair et al., 2017) p-value < 0.01 t-value > 2.58 (two-tailed)

Assessment	Name of Index	Guidelines
		t-value > 2.33 (one-tailed) (Hair et al., 2017) p-value < 0.10 t-value > 1.645 (two-tailed) t-value > 1.28 (one-tailed) (Hair et al., 2017)
R^2	Coefficient of determination	Represents the proportion of the total variation in the endogenous construct (Hair et al., 2017)
f^2	Effect size to R^2	0.35 – Substantial Cohen (1988) 0.15 – Moderate 0.02 – Weak
PLS predict	RMSE / MAE	$Q^2 > 0$ (Hair et al., 2017)

In PLS-SEM predictive analysis, the model leverages training estimates to predict outcomes for a test sample. The procedure involves comparing the Root Mean Squared Error (RMSE) or Mean Absolute Error (MAE) values between PLS-SEM and a simple linear model (LM). Lower RMSE or MAE values for PLS-SEM, compared to LM, indicate that the PLS-SEM model demonstrates superior predictive power, thereby validating its robustness in prediction accuracy.

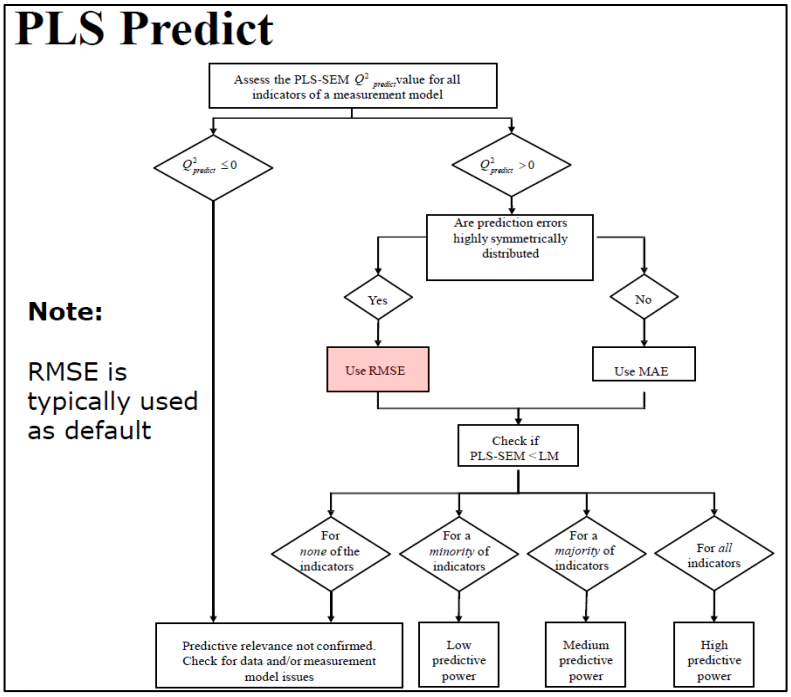

Figure 3.2 Predictive Model Assessment
Source: Schmueli et al. (2016)

3.9 Conclusion

This chapter provided a detailed overview of the research design and methodology used in this study. A quantitative survey method was employed, with primary data collected through the dissemination of questionnaires. The characteristics of the respondents and the data collection procedures were clearly outlined. Central Klang Valley was selected as the target population due to its relevance to the study objectives, and the sample size was determined using G*Power software. The researcher opted for non-probability sampling, specifically purposive sampling, as the sampling frame was unavailable. Following the development of the questionnaire, data collection was carried out, and the analysis was conducted using SPSS for initial steps and SmartPLS for the remainder. Among the two general approaches, Partial Least Squares Structural Equation Modeling (PLS-SEM) was chosen for its suitability and relevance to this study.

CHAPTER 4
FINDING AND ANALYSIS

4.1 Introduction

This section presents the interpretation and evaluation of the data collected from respondents to derive meaningful outcomes. The findings are based on data gathered through questionnaires distributed to the public. Several screening questions were asked to ensure that only participants who met the inclusion criterion are qualified to take part in the survey. The results aim to determine the relationship between gamification components and the continuance intention to use mobile payments (M-payments), with attitude towards M-payment and perceived enjoyment serving as mediating variables. Additionally, this study explores the moderating effect of mindfulness, treated as a second-order construct, on these relationships.

A total of 24 items were used to measure six gamification elements, with each element assessed using four items. For the mediators, four items each were employed to evaluate attitude towards M-payment and perceived enjoyment. Furthermore, 16 items were used to assess the dimensions of mindfulness, with four items assigned to each dimension. Lastly, four items were included to measure usage intention. All items were rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). This odd-numbered scale was chosen to minimize the likelihood of respondents making random selections when undecided, a common issue with even-numbered scales (Joshi et al., 2015; Chyung et al., 2017). In the initial step, data cleaning was conducted and analyzed using latest version of IBM SPSS to identify missing values, assess normality, and examine demographic profiles. Subsequently, the hypotheses were tested using Partial Least Squares Structural Equation Modeling (PLS-SEM). The data analysis followed established guidelines and techniques from previous studies, and was structured around a path model comprising two components: the reflective measurement model and the structural model.

4.2 Data Preparation

4.2.1 Data Cleaning

Prior to conducting statistical analyses, data cleaning procedures were undertaken. A total of 470 questionnaires were personally administered to respondents within the Central Klang Valley area using a face-to-face approach, which facilitated complete data collection. However, only 426 responses were deemed usable, as 44 were excluded due to various data quality issues. The data were assessed for straight-lining, a pattern where respondents provide identical answers across numerous items, which is considered indicative of low-quality responses (Hair et al., 2017). Based on this assessment, 29 responses were removed. An additional 15 responses were excluded because the respondents did not meet the study's eligibility criteria (at least 2 months of prior QR-mobile payment usage). Screening questions were employed to ensure that only qualified participants completed the survey.

The response rate was determined by dividing the number of valid responses by the total number of distributed questionnaires, in line with Mitchell (1989). This study achieved a response rate of 90.64%. Fincham (2008) suggests that while a response rate of approximately 60% is generally acceptable, rates of 90% or higher are preferable for generalizing findings to the broader population. Subsequently, SPSS software was utilized to verify the accuracy of data entry and to identify any missing values. The analysis revealed no missing data, indicating the dataset was complete and ready for further statistical analysis.

Table 4.1
Response Rate

No	Items	Number of responses
1	Total number of questionnaires distributed	470
2	Total number of returned but unusable questionnaires	44
3	Total number of returned and usable questionnaires	426
Total	Percentage of response rate	90.64%

4.2.2 Data Distribution

Partial Least Squares Structural Equation Modeling (PLS-SEM) is a nonparametric statistical technique that does not require data to follow a normal distribution. When choosing between PLS-SEM and Covariance-Based SEM (CB-SEM), it is essential first to assess the normality of the data. Normality is a key assumption in many inferential statistical methods. According to Ghasemi and Zahediasl (2012), violations of normality may not pose significant issues when the sample size exceeds 100. However, regardless of the sample size, testing for normality remains an important step, as it serves as a prerequisite for several statistical procedures.

There are numerous well-established methods available to assess normality, each offering objective insights into the data distribution. Commonly used techniques include the Kolmogorov-Smirnov test, skewness and kurtosis analysis, P-P plots, Q-Q plots, histograms, Shapiro-Wilk test, box plots, and evaluations of the mean with standard deviation (Mishra et al., 2019).

To assess multivariate normality, this study uses both skewness and kurtosis. These two measures help provide a better understanding of the shape of a multivariate distribution. When considered together, they give a more detailed description of the distribution's form beyond just its average and spread. This method is well-supported in the literature, starting with Mardia's foundational work in 1970 and later expanded by Jammalamadaka, Taufer, and Terdik in 2021, who emphasize the importance of using both skewness and kurtosis in multivariate analysis.

Field (2013) indicated that if the result presents the value far from 0, there is possibility that the data are not normally distributed. Apparently, skewness values for all items were in range from -1.543 to -.234 (less than ±1.00). Meanwhile, kurtosis values were in range from -.524 to 2.820 (less than ±3.00). Moreover, the results of this study show that p-value for both skewness and kurtosis were below 0.05 with very large z-scores. This indicates significant deviation from multivariate normality, hence, a violation of the normality assumption. Consequently, the data distribution does not meet the criteria for normality, thereby justifying the use of PLS-SEM for this research. The detailed results are presented in Table 4.2 and Table 4.3 below.

Table 4.2
Result of Skewness and Kurtosis

Items	Skewness	Kurtosis	Items	Skewness	Kurtosis
MN1	-0.778	0.436	ATT3	-0.85	0.558
MN2	-0.717	0.487	ATT4	-0.948	0.93
MN3	-0.798	0.58	PE1	-0.825	0.52
MN4	-0.759	0.554	PE2	-0.817	0.38
DV1	-0.63	0.331	PE3	-0.727	0.173
DV2	-0.612	-0.244	PE4	-0.586	-0.123
DV3	-0.234	-0.524	ET1	-0.437	-0.267
DV4	-0.255	-0.516	ET2	-0.341	-0.384
OW1	-0.62	0.244	ET3	-0.622	0.033
OW2	-0.648	0.137	ET4	-0.8	0.705
OW3	-0.66	0.412	TN1	-1.084	1.016
OW4	-0.61	0.278	TN2	-0.672	0.525
SI1	-0.968	0.484	TN3	-0.698	1.044
SI2	-1.543	2.82	TN4	-0.677	0.781
SI3	-1.17	1.585	AL1	-0.625	0.416
SI4	-0.928	0.429	AL2	-0.602	0.298
UP1	-0.523	-0.203	AL3	-0.539	0.176
UP2	-0.469	-0.296	AL4	-0.524	0.053
UP3	-0.393	-0.266	CA1	-0.499	0.35
UP4	-0.462	-0.222	CA2	-0.514	0.324
AV1	-0.349	-0.404	CA3	-0.711	0.733
AV2	-0.321	-0.34	CA4	-0.983	0.963
AV3	-0.372	-0.318	MCI1	-0.935	0.995
AV4	-0.318	-0.298	MCI2	-1.057	1.49
ATT1	-0.899	0.709	MCI3	-1.066	1.617
ATT2	-0.797	0.604	MCI4	-1.061	1.167

Table 4.3
Result of Multivariate Normality Test

Metric	b (Statistic)	z (Z-score)	p-value
Skewness	1655.277	117524.6760	0.000
Kurtosis	6486.280	115.7954	0.000

4.2.3 Common Method Variance

Common method bias (CMB) can occur when the measurement method itself creates artificial correlations between variables, potentially exaggerating the strength of the relationships (Malhotra, 2010). As explained by Kamakura (2010), this type of bias often arises in studies that rely on self-reported data. Since this research utilizes a self-administered survey for data collection, there is a possibility that CMB may be present. Common method bias refers to self-reported biases that cause CMV, leading to an inflation of the relationship between the variables (Conway & Lance 2010). As this is a cross-

sectional analysis, the same questionnaire collects data over the same period of time, and the use of single respondents to answer all questions could result in a CMV.

To assess this risk, Harman's single-factor test was conducted. This method involves loading all items into an exploratory factor analysis (EFA) without rotation to determine how much of the variance is explained by a single factor (Costello & Osborne, 2005). If one factor accounts for more than 50% of the total variance, it may indicate a significant CMB issue. In this study, analysis using SPSS showed that the first factor explained only 42.14% of the variance, suggesting that common method variance is not a major concern. The full results are available in the Appendix.

In addition to Harman's test, the marker variable technique was also applied, as it is considered a more robust method to detect potential bias (Lindell & Whitney, 2001). This approach involves including a scale in the questionnaire that is theoretically unrelated to the main constructs. For this purpose, the study used the "Attitudes Toward the Colour Blue" instrument developed by Miller and Simmering (2023), which is recognized as an effective marker variable (Simmering et al., 2015). Selecting a valid marker variable is crucial because it acts as a proxy for common method variance. To serve this purpose, the marker variable must engage the same psychological response mechanism as the main survey items (Lindell & Whitney, 2001). In this case, the scale included three items: "I prefer the colour blue," "I do not like the colour blue (reverse code)," and "I like wearing blue clothes."

The data was further analyzed using SmartPLS to compare the model's R^2 values with and without the marker variable. The results showed an increase of 0.004 percent in the R^2 value between the two models. The changes were relatively small and less than 10 percent. According to Fuller et al. (2016) and Podsakoff et al. (2003), this lack of difference indicates that common method bias is not a concern in this study.

Table 4.4
R-square for Marker Variable (MV)

Construct	Without MV	With MV	Changes with MV
M-payment continuance intention	0.463	0.467	0.004

4.3 Frequency Analysis

Frequency analysis was conducted to determine the number of respondents corresponding to each value of a given variable and to express these figures in percentage (%) terms. This analysis is appropriate for evaluating the items in the section on the introduction to QR-code mobile payment and Section A, which pertains to the respondents' profiles. The demographic profile of the respondents was analyzed based on several variables, including gender, age, monthly income or allowance range, frequency of using the selected mobile payment (M-payment) app per week, the range of monthly expenditures on sundry or retail items (including food) using the identified mobile payment app, and the duration of experience using the mobile payment service. Table 4.5 below presents the distribution of each variable, including both frequency and percentage values.

Respondents were asked to identify the mobile payment app they are currently using or the one they are most familiar with. The instruction provided was: “Identify a specific mobile payment app that you are currently using. If you use more than one mobile payment app, select the one that you are most familiar with.” They were presented with seven options, all of which represent providers with a substantial number of active users, extensive merchant networks, and strong technical expertise and resources. The results showed that 47.4% (202 out of 426 respondents) selected the Bank Islam GoApp service, while 30.5% (130 respondents) chose the Maybank2U/MAE service. This was followed by 12.4% (53 respondents) who selected the Touch ‘n Go eWallet service, 8.2% (35 respondents) who selected CIMB Clicks/OCTO, 0.7% (3 respondents) chose Setel, and 0.5% (2 respondents) chose Boost. Notably, only one respondent (0.2%) chose GrabPay service. The distribution of mobile payment applications reflects the characteristics of respondents who met the study’s eligibility criteria and should be interpreted within the context of the sampled users rather than national market share statistics.

According to the data presented in the table above, a total of 297 out of 426 respondents identified as female, which constitutes 69.7% of the overall sample. In contrast, the remaining 129 respondents, or 30.3%, identified as male. This distribution indicates a higher representation of female participants in the study, suggesting that women may be more actively engaged with or responsive to mobile payment-related surveys. The higher proportion of female respondents reflects the demographic composition of the

sampled QR-code mobile payment users and provides insights into the perceptions of this user segment.

The researcher classified the respondents into eight distinct age groups to better understand the age distribution within the sample. The findings reveal that a significant majority, comprising 67.6% (288 respondents), fell within the 18–23 years age group. The second largest group was those aged 24–29 years, accounting for 14.6% (24 respondents), followed closely by respondents aged 40–44 years, who made up 6.3% (27 respondents) of the sample. In addition, 4% (17 respondents) belonged to the 35–39 years category while 3.8% (16 respondents) were in the 30-34 years age group. A smaller proportion, 2.8% (12 respondents), were aged between 45-49 years. Notably, only 0.7% (3 respondents) were in the 50–54 years age group, and a single respondent (0.2%) was aged 55 years or above. This distribution highlights that the majority of mobile payment users in the study are from younger age brackets. This indicates a dominant representation of younger individuals, likely reflecting the tech-savvy demographic that is more inclined toward adopting mobile payment technologies. The predominance of respondents aged 18–23 reflects the characteristics of the targeted QR-code mobile payment users captured through the purposive sampling approach. As younger users are generally more familiar with digital payment technologies, the findings provide valuable insights into a key user segment of QR-code mobile payments.

With regard to the range of monthly income or allowance expenditure, respondents were categorized into five groups. The findings indicate that 37.1% (158 respondents) reported spending less than RM250 per month. Additionally, 25.4% (108 respondents) reported spending in the range of RM250 to RM499, while 23.5% (100 respondents) indicated spending from RM500 to RM749 per month. A further 10.6% (45 respondents) reported spending RM1000 and above monthly. Lowest percentage was observed in the range of RM750 to RM999 (3.5%, 15 respondents).

Plus, respondents were asked to indicate the frequency with which they used their selected mobile payment (M-payment) application on a weekly basis. The results revealed that the highest proportion with 28.2% or 120 respondents reported using M-payment between 3 to 4 times per week. This was followed by 18.5% (79 respondent) who used it more than 10 times a week. Additionally, 13.6%, 58 respondents reported using M-payment

7 to 8 times per week, while 12.4% (53 respondents) indicated usage of 5 to 6 times per week. Another 8.9% (38 respondents) reported using M-payment 1 to 3 times per month. The remaining respondents reported have usage of 1 to 2 times per week, with 7.7% or 33 respondents.

Subsequently, respondents were asked to indicate their average monthly expenditure on sundry or retail items (including food) using the selected M-payment app. The findings indicated that the largest proportion of respondents of 38.7% (165 users) reported spending between RM100 and RM249 per month. This was followed by 36.4% (155 users) who spent between less than RM100 per month. Furthermore, 16.7% (71) of respondents spent RM250–RM499 per month. A smaller proportion, 6.1% (26 respondents), reported spending between RM500 and RM999 per month. The lowest percentage of 2.1% comprised 9 respondents who indicated spending RM1,000 and above per month.

Finally, respondents were asked to indicate the length of their experience using the selected mobile payment service through the question: "How long is your experience using the identified mobile payment app?" The majority of 38.7% (165 respondents) reported having used the M-payment application for up to two years. This was followed by 31.7% (135 respondents) who indicated usage experience of three years and above, and 14.8% (63 respondents) who reported one year of usage. A smaller portion of respondents of 6.2% (26 respondents) had been using the app for between 6-12 months, while 4.7% (20 respondents) had experience limited to 4-6 months. Additionally, 4% or 17 respondents reported had usage duration of 1 to 3 months.

Table 4.5
Respondents Profile (n=426)

Items		Frequency	Percentage (%)
Most Familiar Mobile Payment App	Touch and Go E-wallet	53	12.4
	Boost	2	.5
	GrabPay	1	.2
	Setel	3	.7
	Maybank2U/ MAE	130	30.5
	Cimb Click/ OCTO	35	8.2
	Bank Islam GoApp	202	47.4
Gender	Male	129	30.3
	Female	297	69.7
Age	18-23 years old	288	67.6
	24-29 years old	62	14.6
	30-34 years old	16	3.8

Items		Frequency	Percentage (%)
	35-39 years old	17	4.0
	40-44 years old	27	6.3
	45-49 years old	12	2.8
	50-54 years old	3	.7
	55 years and above	1	.2
Monthly income/allowance expenditure range	Less than RM250	158	37.1
	RM250 to RM499	108	25.4
	RM500 to RM749	100	23.5
	RM750 to RM999	15	3.5
	RM1000 & above	45	10.6
Weekly frequency of M-payment usage	1 - 3 times per month	38	8.9
	1 - 2 times per week	33	7.7
	3 - 4 times per week	120	28.2
	5 - 6 times per week	53	12.4
	7 - 8 times per week	58	13.6
	9 - 10 times per week	45	10.6
	More than 10 times a week	79	18.5
Monthly retail expenditure via the selected mobile payment app	Less than RM100	155	36.4
	RM100 to RM249	165	38.7
	RM250-RM499	71	16.7
	RM500-RM999	26	6.1
	RM1000 and above	9	2.1
Experience using the mobile payment service	1 - 3 months	17	4.0
	4 - 6 months	20	4.7
	6 - 12 months	26	6.2
	1 year	63	14.8
	2 years	165	38.7
	3 years and above	135	31.7
Total		426	100

4.4 Descriptive analysis

Descriptive analysis was conducted to compute the mean and standard deviation for each variable based on the collected data. According to the rule of thumb proposed by Jamil (2002), a mean score ranging from 1.00 to 2.33 is interpreted as low, 2.34 to 3.67 as moderate, and 3.68 to 5.00 as high.

Table 4.6
Descriptive Analysis of All Variables

Variables	Mean	Standard Deviation	Minimum	Maximum
Independent Variables				
Meaning	4.20	0.639	1.00	5.00
Development	3.86	0.773	1.00	5.00
Ownership	3.89	0.797	1.00	5.00
Social influence	4.36	0.610	1.25	5.00

Variables	Mean	Standard Deviation	Minimum	Maximum
Unpredictability	3.94	0.792	1.00	5.00
Avoidance	3.77	0.821	1.00	5.00
Mediating Variables				
Attitude towards M-payment	4.24	0.683	1.00	5.00
Perceived Enjoyment	4.12	0.759	1.00	5.00
Moderating Variables: Mindfulness				
Engagement with technology	3.96	0.722	1.25	5.00
Technological novelty seeking	4.03	0.689	1.00	5.00
Awareness of local context	4.11	0.658	1.00	5.00
Cognizance of alternative technologies	3.91	0.729	1.00	5.00
Dependent Variable				
M-payment Continuance intention	4.30	0.680	1.00	5.00

All variables were measured using a 5-point Likert scale. As presented in Table 4.6, the variables are categorized into four groups: independent variables, mediating variables, moderating variables, and the dependent variable.

Within the group of independent variables, social influence recorded the highest mean value (M = 4.36, SD = 0.61), indicating strong agreement among respondents. This was followed by meaning (M = 4.20, SD = 0.64) and unpredictability (M = 3.94, SD = 0.79). Ownership (M = 3.89, SD = 0.80) and development (M = 3.86, SD = 0.77) followed closely behind. The variable with the lowest mean value was avoidance, with a mean of 3.77 and a standard deviation of 0.82.

For the mediating variables, attitude towards M-payment recorded a slightly higher mean value (M = 4.24, SD = 0.68) compared to perceived enjoyment (M = 4.12, SD = 0.76).

The group of moderating variables consists of engagement with technology, technological novelty seeking, awareness of local context, and cognizance of alternative technologies. Among these, awareness of local context demonstrated the highest mean score (M = 4.11, SD = 0.66). This is followed by technological novelty seeking (M = 4.03, SD = 0.69) and engagement with technology (M = 3.96, SD = 0.72). The variable with the lowest mean within this group is cognizance of alternative technologies (M = 3.91, SD = 0.73).

Regarding the dependent variable, M-payment continuance intention showed a relatively high mean value of 4.30 with a standard deviation of 0.68, indicating a generally positive inclination toward continued use among respondents.

4.5 Construct Operationalization

The operationalization of constructs and their corresponding measures plays a critical role in research planning. In this study, the process of construct operationalization within the PLS-SEM framework is guided by the recommendations of Ramayah et al. (2018) and Hair et al. (2014). Within PLS-SEM, constructs are categorized as either exogenous or endogenous latent variables. Exogenous latent variables serve as causal antecedents that influence other constructs within the model, while endogenous latent variables function similarly to dependent variables, representing outcomes influenced by other constructs.

In this study, meaning, development, ownership, social influence, unpredictability, and avoidance are identified as exogenous constructs. Attitude towards M-payment, perceived enjoyment, and mindfulness comprising engagement with technology, technological novelty seeking, awareness of the local context, and cognizance of alternative technologies serve as intervening variables. Meanwhile, M-payment continuance intention is designated as the endogenous construct.

This study employed a reflective measurement model to assess whether the underlying constructs influence their respective indicators (observed variables). In reflective models, the indicators are considered manifestations of the latent construct, meaning that changes in the construct are expected to be reflected consistently across all associated indicators. This approach is suitable for the current research because the constructs under investigation such as perceived enjoyment, social influence, and attitude towards M-payment are abstract psychological or behavioral concepts that are assumed to cause variation in their respective observed measures.

The operationalization of each construct, including its construct code, role in model, and PLS-SEM type, is summarized in Table 4.7 below.

Table 4.7
Construct Operationalisation Matrix

Construct	Operationalization	Construct code	Role in Model
Meaning	First-order reflective	MN	Independent (exogenous) variable
Development	First-order reflective	DV	Independent (exogenous) variable
Ownership	First-order reflective	OW	Independent (exogenous) variable
Social influence	First-order reflective	SI	Independent (exogenous) variable
Unpredictability	First-order reflective	UP	Independent (exogenous) variable
Avoidance	First-order reflective	AV	Independent (exogenous) variable
Attitude towards M-payment	First-order reflective	ATT	Mediating variable
Perceived Enjoyment	First-order reflective	PE	Mediating variable
Mindfulness	Second-order reflective:		
Engagement with technology	First-order reflective	ET	Moderating variable
Technological novelty seeking	First-order reflective	TN	Moderating variable
Awareness of local context	First-order reflective	AL	Moderating variable
Cognizance of alternative technologies	First-order reflective	CA	Moderating variable
M-payment Continuance intention	First-order reflective	MCI	Dependent (endogenous) variable

4.6 Inferential Analysis

The measurement and structural models serve to examine the relationships between observed indicators and their underlying latent constructs. This approach facilitates the evaluation of how well the proposed theoretical framework aligns with the empirical data, thereby assessing the model's overall fit and explanatory power. SmartPLS was employed to evaluate both the measurement and structural models in this study, in line with the procedures of Partial Least Squares Structural Equation Modeling (PLS-SEM) (Hair et al., 2017). This approach allows for the simultaneous assessment of the psychometric properties of the measurement model and the estimation of the relationships specified in the structural model. The detailed steps involved in assessing both the measurement and structural models are elaborated in the subsequent section.

4.6.1 Evaluation of Measurement Model

4.6.1.1 Indicator Reliability Analysis

Outer loadings play a crucial role in assessing the convergent validity of reflective constructs, ensuring that the measurement model aligns with the research objectives (Urbach & Ahlemann, 2010). Average Variance Extracted (AVE) is a measure of convergent validity that summarizes the variance explained by all items loading onto a single construct (Hair et al., 2010).

The commonly accepted threshold for standardized outer loadings is 0.708 or higher (Hair et al., 2017). However, indicators with loadings below 0.708 are not automatically removed, as their deletion may adversely affect the composite reliability and the overall validity of the constructs. Indicators with outer loadings between 0.40 and 0.70 are considered for removal only if their exclusion improves composite reliability or AVE (Ramayah et al., 2018).

Apparently, all items have outer loadings of 0.708 or higher, with the exceptions of TN1 with outer loading of 0.689. After the exclusion of TN1, both composite reliability (CR) and average variance extracted (AVE) improved. Specifically, removing TN1 improved AVE from 0.681 to 0.751, while CR has increased from 0.895 to 0.900. Consequently, this item was removed, while the remaining items were retained. Conceptually, TN1 was excluded because its statement focuses on respondents' recognition of differences between mobile payment and previously used payment methods, which may reflect comparative evaluation rather than the broader construct of technological novelty seeking. The remaining indicators more directly capture users' awareness and appreciation of the uniqueness and novelty of mobile payment technology. The details are presented in Table 4.8 and Table 4.9 below.

Table 4.8
Indicator Reliability

Construct	Items	Statement	Outer loading > 0.7
Meaning	MN1	I feel that my mobile payment transactions have a meaningful impact on society	0.788
	MN2	I feel a sense of purpose when making mobile payments, as it connects to a larger goal.	0.844

Construct	Items	Statement	Outer loading > 0.7
	MN3	The mobile payment app allows me to contribute to a better world	0.853
	MN4	The mobile payment app enables me to contribute to the greater good.	0.816
Development	DV1	I feel a sense of accomplishment when I successfully complete a challenge in the mobile payment app.	0.819
	DV2	I feel motivated to gain points or rewards in the mobile payment app.	0.864
	DV3	I feel that I need to complete the tasks/challenges offered in the mobile payment app.	0.856
	DV4	The tasks/challenges in the mobile payment app pushes me to strive for accomplishments.	0.848
Ownership	OW1	I feel proud of what I own when I earn reward points in this mobile payment app.	0.826
	OW2	I care about the reward points that I've earned through this mobile payment app.	0.869
	OW3	I feel a deep sense of belonging to this mobile payment app when I accumulate reward points.	0.910
	OW4	I have a strong sense of ownership of the reward points I've gained in this mobile payment app.	0.904
Social Influence	SI1	I can add my friends and family to a list of favorite recipients using this mobile payment app.	0.748
	SI2	I can easily transfer money to my friends and family using this mobile payment app.	0.771
	SI3	I feel a sense of connection when my friends and family also use mobile payments.	0.828
	SI4	Having a network of friends and family who use mobile payments inspires me to do the same.	0.818
Unpredictability	UP1	I am interested in finding out the rewards this mobile app will offer in the next update	0.877
	UP2	I am interested in finding out the features this mobile app will offer in the update.	0.897
	UP3	I am curious about the rewards this mobile payment app will offer in the next update.	0.918
	UP4	I am curious about the features this mobile payment app will offer in the next update.	0.915
Avoidance	AV1	I do not want to miss any of the offers provided by this mobile payment app.	0.869
	AV2	I do not want to lose my progress in accumulating reward points in this mobile payment app.	0.893
	AV3	I fear losing potential benefits or rewards offered if I stop using this mobile payment app.	0.902
	AV4	I fear my accumulated reward points will expire if I stop using this mobile payment app.	0.902
Attitude towards M-payment	ATT1	All things considered; I find using this mobile payment app to be a good idea.	0.855
	ATT2	All things considered; I find using this mobile payment app to be a positive thing.	0.910
	ATT3	All things considered; I find using this the mobile payment app to be favourable.	0.920
	ATT4	All things considered, using this this mobile payment app is a wise idea.	0.867
	PE1	I find this mobile payment app entertaining	0.895

Construct	Items	Statement	Outer loading > 0.7
Perceived enjoyment	PE2	I find this mobile payment app enjoyable.	0.925
	PE3	I find this mobile payment app exciting.	0.923
	PE4	I find this mobile payment app fun.	0.859
Engagement with technology	ET1	I did some research on mobile payment before making the adoption decision.	0.853
	ET2	I gathered facts about mobile payment before making the adoption decision.	0.871
	ET3	I explored mobile payment before deciding to use it.	0.862
	ET4	I examined the functions of mobile payment before deciding to use it.	0.825
Technology novelty seeking	TN2	I identified how mobile payment is unique in relation to alternative payment methods.	0.862
	TN3	I was mindful about how mobile payment differed from alternative payment methods.	0.871
	TN4	I noticed the uniqueness of mobile payment as compared to other payment methods.	0.866
Awareness of local context	AL1	When making the decision to adopt mobile payment, I thought about how it might help my purchase experience.	0.834
	AL2	When making the decision to adopt mobile payment, I thought about how it might change my purchase experience.	0.882
	AL3	When making the decision to adopt mobile payment, I thought about how it might be compatible with my purchase requirements.	0.893
	AL4	When making the decision to adopt mobile payment, I thought about how it might fulfill my shopping needs.	0.854
Cognizance of alternative technology	CA1	I considered alternative views regarding mobile payment before making the adoption decision.	0.844
	CA2	I am aware of alternative payment methods to mobile payment before deciding to adopt it.	0.899
	CA3	I considered alternative payment methods to meet my needs before deciding to adopt mobile payment.	0.870
	CA4	I considered alternative payment methods to meet my needs when deciding to adopt mobile payment.	0.749
M-payment continuance intention	MCI1	I intend to continue using this mobile payment app in the future.	0.879
	MCI2	I expect to continue using this mobile payment app in the future.	0.895
	MCI3	I will keep using this mobile payment app.	0.922
	MCI4	I have decided to continue using this mobile payment app.	0.901

Table 4.9
Item Removed

Construct	Items	Statement				Outer loading <0.7
Technology novelty seeking	TN1	I noted the differences between mobile payment and alternative payment methods I previously used.				0.689
		Before deletion		After deletion		
		AVE	CR	AVE	CR	
		0.681	0.895	0.784	0.916	

4.6.1.2 Internal Consistency Reliability Analysis

Internal consistency is commonly assessed using Cronbach's Alpha, which determines whether a construct demonstrates a coherent range and meaning (Cronbach, 1971). Cronbach's Alpha also estimates reliability based on the intercorrelations among observed indicators. However, it has been criticized for being a lower bound estimate, often underestimating true reliability. As an alternative, composite reliability has gained popularity, particularly in conjunction with structural equation modeling (Peterson & Kim, 2013). Consequently, this study opts for composite reliability over Cronbach's Alpha to measure internal consistency, following the recommendations of Hair et al. (2017). Notably, numerous studies have affirmed that composite reliability is a superior and more accurate metric for internal consistency, especially in contexts involving modern statistical modeling techniques or unequal item loadings (Hermosilla & Alvarado, 2016).

While Cronbach's Alpha assumes equal weighting of indicators, composite reliability is considered more appropriate as it accounts for the differential weights of indicators (Dijkstra & Henseler, 2015; Chin, 1998). Composite reliability ranges from 0 to 1, with higher values indicating greater levels of reliability (Hair et al., 2017). A composite reliability (CR) value of 0.7 or higher is typically regarded as acceptable, signifying an adequate level of internal consistency. This threshold indicates that the items within a scale reliably measure the same underlying construct (Gefen et al., 2000). The results of this study demonstrated that all components exceeded the threshold value of 0.7, confirming their reliability. This finding indicates that the items are sufficiently correlated and consistently represent the intended construct. The details are displayed in table 4.10 below.

Table 4.10
Internal Consistency Reliability

Construct	Cronbach's Alpha	CR > 0.7
Independent Variables		
Meaning	0.844	0.895
Development	0.869	0.910
Ownership	0.900	0.931
Social influence	0.802	0.870
Unpredictability	0.924	0.946
Avoidance	0.914	0.939
Mediating Variables		
Attitude towards M-payment	0.911	0.937
Perceived Enjoyment	0.922	0.945
Moderating Variables: Mindfulness	0.938	0.911
Engagement with technology	0.875	0.914
Technological novelty seeking	0.841	0.916
Awareness of local context	0.889	0.923
Cognizance of alternative technologies	0.862	0.907
Dependent Variable		
M-payment Continuance intention	0.921	0.944

4.6.1.3 Convergent Validity Analysis

At the construct level, convergent validity is assessed using the Average Variance Extracted (AVE). AVE represents the average of the squared loadings of all indicators associated with a construct, providing a measure of the shared variance between the construct and its indicators. According to Bagozzi and Yi (1998), Fornell and Larcker (1981), and Hair et al. (2017), achieving convergent validity requires that each construct explains at least 50% of the variance in its associated indicators, corresponding to an AVE value greater than 0.50.

The results presented in Table 4.11 indicate that all constructs in this study met the recommended threshold for AVE, with values ranging from 0.627 to 0.814. These findings confirm that each construct demonstrated a satisfactory level of convergent validity, with the AVE values exceeding the minimum requirement of 0.50. This outcome provides strong evidence that the indicators consistently and reliably represent their respective constructs, enhancing the overall validity of the measurement model used in this research.

Table 4.11
Convergent Validity

Construct	AVE > 0.5
Independent Variables	
Meaning	0.682
Development	0.717
Ownership	0.770
Social influence	0.627
Unpredictability	0.814
Avoidance	0.795
Mediating Variables	
Attitude towards M-payment	0.789
Perceived Enjoyment	0.811
Moderating Variables: Mindfulness	0.725
Engagement with technology	0.727
Technological novelty seeking	0.784
Awareness of local context	0.750
Cognizance of alternative technologies	0.710
Dependent Variable	
M-payment Continuance intention	0.809

4.6.1.4 Discriminant Validity Analysis

Discriminant validity assesses the extent to which indicators differentiate between constructs or measure distinct concepts by examining correlations among potentially overlapping measures (Hair et al., 2017). It ensures that a construct is conceptually and empirically distinct from other constructs in the model, thereby enhancing the robustness of the measurement model.

In PLS-SEM, researchers commonly employ three techniques to evaluate discriminant validity: the cross-loading criterion (Chin, 1998), the Fornell-Larcker criterion (Fornell & Larcker, 1981), and the Heterotrait-Monotrait Ratio of Correlations (HTMT) (Henseler et al., 2015). Each method provides a different perspective on the construct's uniqueness and its separation from other constructs.

The cross-loading criterion requires that the loading of each indicator on its designated latent variable be higher than its loadings on all other latent variables. As shown in the table below, the discriminant analysis was conducted by comparing cross-loadings between constructs. The results demonstrate that all indicator loadings are higher on their assigned constructs and lower on other constructs. This pattern confirms that discriminant validity is achieved, indicating that the constructs are conceptually and empirically distinct.

Table 4.12
Cross Loadings

	Attitude towards M-payment	Avoidance	Awareness of Local Context	Cognizance of Alternative Technology	Development	Engagement with Technology	M-payment Continuance Intention	Meaning	Ownership	Perceived Enjoyment	Social Influence	Technological Novelty Seeking	Unpredictability
AL1	0.535	0.417	**0.834**	0.527	0.410	0.515	0.533	0.442	0.428	0.569	0.485	0.740	0.475
AL2	0.492	0.457	**0.882**	0.545	0.458	0.542	0.556	0.476	0.444	0.591	0.488	0.648	0.497
AL3	0.467	0.443	**0.893**	0.588	0.447	0.540	0.565	0.535	0.440	0.558	0.467	0.620	0.467
AL4	0.518	0.414	**0.854**	0.541	0.428	0.488	0.553	0.507	0.414	0.489	0.485	0.555	0.437
ATT1	**0.855**	0.290	0.484	0.448	0.336	0.420	0.586	0.488	0.309	0.484	0.506	0.516	0.369
ATT2	**0.910**	0.357	0.546	0.472	0.363	0.450	0.600	0.520	0.377	0.554	0.531	0.509	0.403
ATT3	**0.920**	0.356	0.528	0.445	0.384	0.424	0.586	0.525	0.371	0.573	0.523	0.525	0.393
ATT4	**0.867**	0.316	0.504	0.406	0.332	0.410	0.571	0.439	0.350	0.529	0.496	0.505	0.374
AV1	0.315	**0.869**	0.450	0.407	0.554	0.439	0.306	0.374	0.591	0.398	0.388	0.407	0.712
AV2	0.352	**0.893**	0.464	0.419	0.585	0.431	0.315	0.423	0.630	0.434	0.407	0.378	0.684
AV3	0.301	**0.902**	0.439	0.374	0.498	0.426	0.287	0.394	0.555	0.457	0.369	0.360	0.674
AV4	0.356	**0.902**	0.431	0.397	0.564	0.437	0.307	0.412	0.587	0.442	0.365	0.412	0.670
CA1	0.449	0.472	0.614	**0.845**	0.453	0.534	0.448	0.473	0.432	0.506	0.383	0.525	0.449
CA2	0.425	0.370	0.549	**0.899**	0.384	0.531	0.528	0.400	0.392	0.457	0.400	0.482	0.407
CA3	0.405	0.410	0.540	**0.871**	0.424	0.523	0.523	0.381	0.429	0.517	0.369	0.485	0.437
CA4	0.401	0.235	0.424	**0.748**	0.283	0.431	0.428	0.379	0.314	0.335	0.339	0.460	0.284
DV1	0.416	0.441	0.422	0.407	**0.819**	0.451	0.406	0.568	0.522	0.442	0.419	0.407	0.431
DV2	0.333	0.535	0.396	0.401	**0.864**	0.496	0.360	0.521	0.684	0.431	0.391	0.385	0.500
DV3	0.281	0.576	0.419	0.370	**0.856**	0.422	0.283	0.414	0.633	0.420	0.325	0.353	0.529
DV4	0.305	0.550	0.466	0.384	**0.848**	0.460	0.308	0.434	0.648	0.443	0.320	0.396	0.510
ET1	0.362	0.407	0.472	0.517	0.467	**0.853**	0.405	0.386	0.470	0.544	0.375	0.468	0.428
ET2	0.406	0.458	0.522	0.511	0.491	**0.871**	0.417	0.457	0.483	0.528	0.410	0.539	0.487
ET3	0.453	0.395	0.541	0.521	0.460	**0.862**	0.484	0.374	0.422	0.489	0.411	0.581	0.438
ET4	0.410	0.397	0.519	0.503	0.429	**0.825**	0.452	0.343	0.426	0.489	0.429	0.632	0.447
MCI1	0.646	0.310	0.584	0.535	0.369	0.472	**0.879**	0.484	0.348	0.476	0.521	0.527	0.396
MCI2	0.603	0.309	0.584	0.506	0.348	0.485	**0.895**	0.429	0.326	0.506	0.542	0.528	0.386
MCI3	0.570	0.305	0.567	0.519	0.373	0.454	**0.922**	0.471	0.336	0.480	0.529	0.500	0.373
MCI4	0.544	0.299	0.553	0.495	0.365	0.443	**0.901**	0.429	0.320	0.450	0.512	0.492	0.379
MN1	0.442	0.300	0.394	0.343	0.461	0.318	0.418	**0.788**	0.446	0.383	0.415	0.316	0.369
MN2	0.485	0.411	0.484	0.412	0.439	0.373	0.406	**0.844**	0.475	0.472	0.467	0.416	0.420
MN3	0.465	0.362	0.493	0.434	0.448	0.410	0.416	**0.853**	0.532	0.458	0.443	0.410	0.389
MN4	0.442	0.407	0.493	0.410	0.562	0.405	0.431	**0.816**	0.470	0.457	0.465	0.408	0.445

	Attitude towards M-payment	Avoidance	Awareness of Local Context	Cognizance of Alternative Technology	Development	Engagement with Technology	M-payment Continuance Intention	Meaning	Ownership	Perceived Enjoyment	Social Influence	Technological Novelty Seeking	Unpredictability
OW1	0.357	0.535	0.439	0.408	0.586	0.435	0.291	0.569	**0.826**	0.401	0.358	0.395	0.493
OW2	0.353	0.550	0.409	0.402	0.633	0.467	0.336	0.410	**0.869**	0.415	0.381	0.395	0.525
OW3	0.335	0.628	0.450	0.418	0.655	0.484	0.317	0.547	**0.910**	0.457	0.424	0.417	0.609
OW4	0.348	0.610	0.452	0.414	0.690	0.465	0.354	0.519	**0.904**	0.477	0.387	0.394	0.573
PE1	0.517	0.395	0.561	0.487	0.452	0.521	0.487	0.463	0.402	**0.895**	0.478	0.528	0.433
PE2	0.566	0.471	0.598	0.499	0.469	0.531	0.467	0.465	0.464	**0.925**	0.474	0.554	0.490
PE3	0.543	0.447	0.582	0.462	0.483	0.514	0.468	0.509	0.477	**0.923**	0.478	0.557	0.472
PE4	0.542	0.436	0.557	0.508	0.447	0.594	0.495	0.498	0.456	**0.858**	0.449	0.504	0.462
SI1	0.424	0.265	0.417	0.298	0.328	0.371	0.440	0.405	0.302	0.381	**0.748**	0.347	0.334
SI2	0.468	0.173	0.345	0.280	0.254	0.317	0.479	0.429	0.245	0.322	**0.771**	0.340	0.255
SI3	0.447	0.441	0.491	0.386	0.394	0.402	0.466	0.435	0.419	0.453	**0.828**	0.469	0.505
SI4	0.493	0.445	0.494	0.423	0.382	0.413	0.473	0.449	0.413	0.481	**0.818**	0.472	0.564
TN2	0.510	0.313	0.602	0.515	0.383	0.592	0.490	0.348	0.344	0.482	0.393	**0.869**	0.372
TN3	0.517	0.426	0.667	0.522	0.427	0.579	0.504	0.476	0.454	0.528	0.506	**0.891**	0.465
TN4	0.510	0.417	0.698	0.503	0.402	0.562	0.521	0.426	0.410	0.569	0.477	**0.895**	0.441
UP1	0.385	0.689	0.501	0.403	0.546	0.451	0.355	0.413	0.573	0.469	0.477	0.399	**0.877**
UP2	0.401	0.651	0.466	0.417	0.461	0.461	0.430	0.433	0.517	0.402	0.515	0.437	**0.897**
UP3	0.363	0.745	0.490	0.437	0.566	0.502	0.348	0.459	0.603	0.507	0.443	0.444	**0.918**
UP4	0.415	0.681	0.497	0.446	0.513	0.490	0.411	0.469	0.568	0.477	0.499	0.459	**0.915**

This research employed the Heterotrait-Monotrait (HTMT) ratio as an alternative approach to assess discriminant validity, addressing the limitations of the Fornell-Larcker criterion in effectively detecting discriminant validity. Henseler et al. (2015) define HTMT as the ratio of between-trait correlations to within-trait correlations, effectively estimating the true correlation between two constructs if they were perfectly measured.

In the HTMT analysis, two ways are commonly used to identify issues related to discriminant validity. The first involves applying threshold values: HTMT.85, where values exceeding 0.85 indicate potential concerns (Kline, 2011), and HTMT.90, where the threshold is set at 0.90 (Gold et al., 2001). The second method examines the HTMT value for structural paths, where a value of 1 suggests a lack of discriminant validity.

As shown in Table 4.13, the correlation values range from 0.371 to 0.845. Thus, all computed values satisfy the criteria for both HTMT.85 and HTMT.90, thereby establishing discriminant validity. Furthermore, the HTMT inference analysis reveals that none of the confidence intervals for the constructs include the value of 1, providing additional confirmation of discriminant validity.

Table 4.13
HTMT Criterion

	MN	DV	OW	UP	AV	SI	ATT	PE	MIND	MCI
Meaning										
Development	0.669									
Ownership	0.668	0.829								
Unpredictability	0.556	0.647	0.687							
Avoidance	0.510	0.696	0.730	0.836						
Social Influence	0.659	0.510	0.513	0.609	0.489					
Attitude towards M-payment	0.633	0.443	0.438	0.473	0.407	0.676				
Perceived Enjoyment	0.607	0.573	0.548	0.557	0.528	0.601	0.657			
Mindfulness	0.661	0.638	0.624	0.637	0.590	0.677	0.690	0.744		
M-payment Continuance Intention	0.572	0.448	0.405	0.463	0.371	0.681	0.717	0.576	0.727	

4.6.1.5 Summary of Measurement Model

Since this study use reflective measurement model, thus three types of validity were assessed namely convergent validity, internal consistency and discriminant validity. Apparently, all components exceeded the threshold value of 0.7 (Gefen et al., 2000), confirming their reliability. They are sufficiently correlated and consistently represent the intended construct. After indicator reliability was analyzed, TN1 (which with outer loadings below 0.708) was removed as the AVE and CR are improved after the removal, while the remaining items were retained.

Meanwhile, each construct demonstrated a satisfactory level of convergent validity, with the AVE values exceeding the minimum requirement of 0.5 (0.627 to 0.814). Regarding discriminant, each component has loadings that are higher on their assigned constructs and lower on other constructs. Plus, the results of the HTMT inference also show that the confidence level interval does not show a value of 1 on any of the constructs, which also confirms the discriminant validity. The summary of measurement model depicted in table 4.14 below.

Table 4.14
Summary of Measurement Model

First order	**Second order**	**Items**	**Convergent validity**		**Internal consistency reliability**	**Discriminant validity**
			Outer loadings	**AVE > 0.5**	**CR > 0.7**	**HTMT > 0.85**
Meaning		MN1	0.788	0.682	0.895	YES
		MN2	0.844			
		MN3	0.853			
		MN4	0.816			
Development		DV1	0.819	0.717	0.910	YES
		DV2	0.864			
		DV3	0.856			
		DV4	0.848			
Ownership		OW1	0.826	0.770	0.931	YES
		OW2	0.869			
		OW3	0.910			
		OW4	0.904			

First order	Second order	Items	Convergent validity		Internal consistency reliability	Discriminant validity
			Outer loadings	AVE > 0.5	CR > 0.7	HTMT > 0.85
Social Influence		SI1	0.748	0.627	0.870	YES
		SI2	0.771			
		SI3	0.828			
		SI4	0.818			
Unpredictability		UP1	0.877	0.814	0.946	YES
		UP2	0.897			
		UP3	0.918			
		UP4	0.915			
Avoidance		AV1	0.869	0.795	0.939	YES
		AV2	0.893			
		AV3	0.902			
		AV4	0.902			
Attitude towards M-payment		ATT1	0.855	0.789	0.937	YES
		ATT2	0.910			
		ATT3	0.920			
		ATT4	0.867			
Perceived enjoyment		PE1	0.895	0.811	0.945	YES
		PE2	0.925			
		PE3	0.923			
		PE4	0.859			
Engagement with technology		ET1	0.853	0.727	0.914	YES
		ET2	0.871			
		ET3	0.862			
		ET4	0.825			
Technology novelty seeking		TN2	0.862	0.784	0.916	YES
		TN3	0.871			
		TN4	0.866			
Awareness of local context		AL1	0.834	0.750	0.923	YES
		AL2	0.882			
		AL3	0.893			
		AL4	0.854			

First order	Second order	Items	Convergent validity		Internal consistency reliability	Discriminant validity
			Outer loadings	**AVE > 0.5**	**CR > 0.7**	**HTMT > 0.85**
Cognizance of alternative technology		CA1	0.844	0.710	0.907	YES
		CA2	0.899			
		CA3	0.870			
		CA4	0.749			
	Mindfulness	Engagement with technology	0.834	0.715	0.909	YES
		Technology novelty seeking	0.866			
		Awareness of local context	0.881			
		Cognizance of alternative technology	0.823			
M-payment continuance intention		MCI1	0.879	0.809	0.944	YES
		MCI2	0.895			
		MCI3	0.922			
		MCI4	0.901			

Item removed: TN1

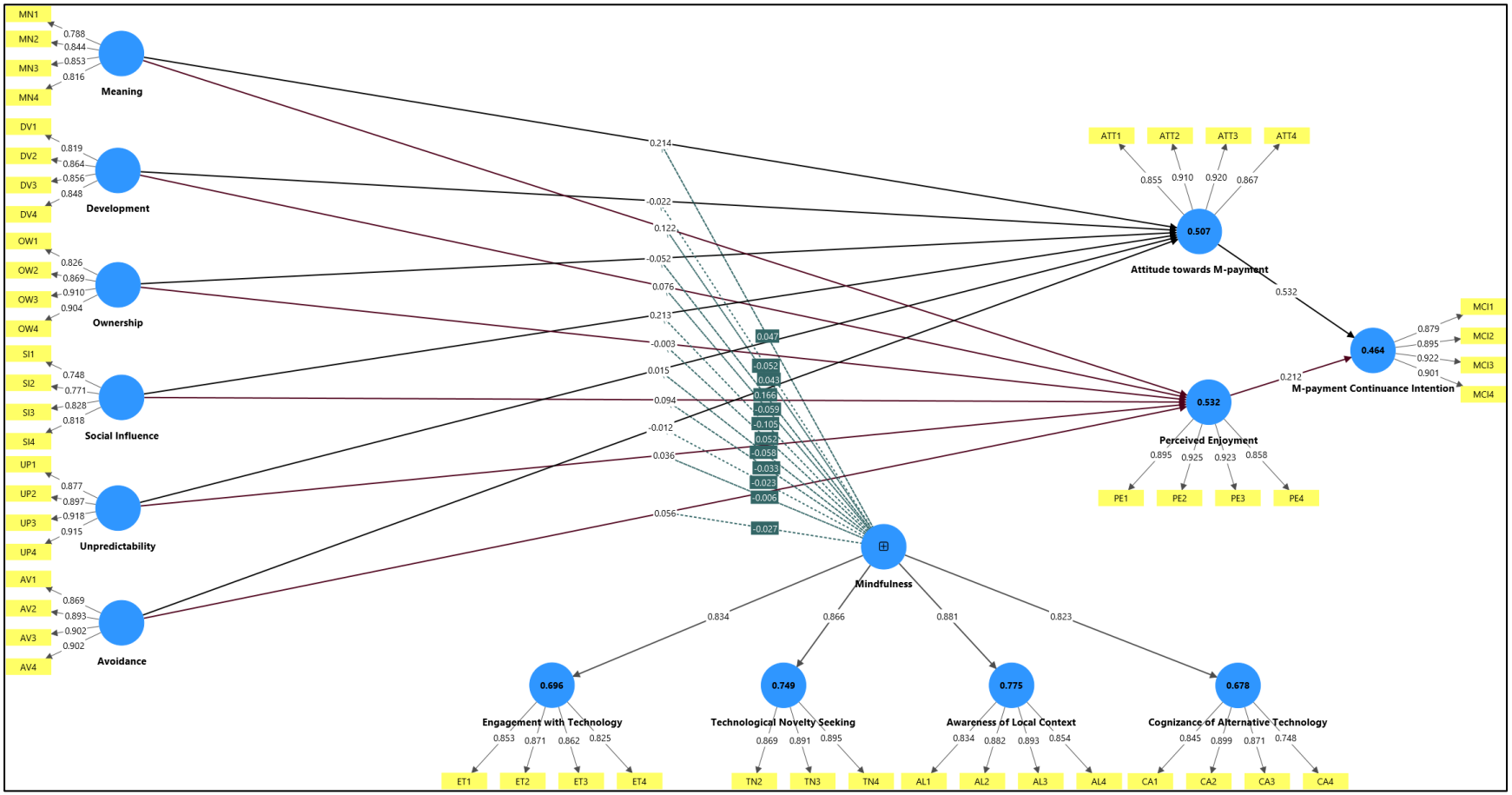

Figure 4.1 Measurement Model Analysis

4.6.2 Evaluation of Structural Model

4.6.2.1 Assessment of Lateral Collinearity

This study identified potential collinearity issues in the structural model during its initial phase. To evaluate collinearity, the same guidelines used for assessing formative measurement models were applied, specifically by examining the Variance Inflation Factor (VIF) values. Only the direct effects were assessed in this section. In structural equation modeling (SEM), particularly in models with mediators and moderators, VIF is usually calculated for direct effects. This is because VIF evaluates the extent to which a predictor variable is correlated with other predictors in the model. Addressing multicollinearity is important because it can distort the estimation of regression coefficients and make it challenging to identify the unique contribution of each predictor (Hair et al., 2017).

The result proposed, the VIF values for all independent variables (meaning, development, ownership, social influence, unpredictability, and avoidance) were found to be below the threshold of 3. They were assessed as exogeneous to mediators: attitude towards M-payment and perceived enjoyment. Additionally, the analysis revealed that the VIF values for the mediators (exogenous to M-payment continuance intention) were also below 3. Therefore, multicollinearity was not a concern, which, verify the robustness of the model.

Table 4.15
Lateral Collinearity Assessment

Exogenous construct	**Endogenous construct**	**VIF ≤ 3.0**
Attitude towards M-payment	M-payment continuance intention	1.569
Perceived Enjoyment		1.569
Meaning	Attitude towards M-payment	1.887
Development		2.474
Ownership		2.760
Social influence		1.640
Unpredictability		2.894
Avoidance		2.885
Meaning	Perceived Enjoyment	1.887
Development		2.474
Ownership		2.760
Social influence		1.640
Unpredictability		2.894
Avoidance		2.885

4.6.2.2 Assessment of the Significance and Relevance of the Structural Model Relationships

When collinearity is not a concern, the study is ready to evaluate the significance and relevance of the structural model. This analysis examines the relationships hypothesized between the constructs. Next, the hypotheses for each path were tested via a bootstrapping technique with 10,000 sub-samples (Becker et al., 2023).

In this research, 14 direct hypotheses were formulated to examine the relationships among the constructs. To interpret the path model results, the bootstrapping features in SmartPLS were utilized. This approach evaluates the significance of the structural models using t-values, p-values, and bootstrap confidence intervals. The results of hypothesis testing are summarized in Table 4.16.

Table 4.16
Hypotheses Testing

Hypothesis	Relationship	Coefficient (β)	Std error	t-value	Confidence interval		Decision
					2.5%	97.5%	
H1a	MN → ATT	0.316**	0.055	5.730	0.206	0.424	Supported
H1b	MN → PE	0.212**	0.060	3.522	0.096	0.332	Supported
H2a	DV → ATT	0.022	0.064	0.351	-0.100	0.150	Not supported
H2b	DV → PE	0.141*	0.069	2.063	0.005	0.273	Supported
H3a	OW → ATT	-0.022	0.065	0.336	-0.144	0.107	Not supported
H3b	OW → PE	0.041	0.083	0.493	-0.119	0.206	Not supported
H4a	SI → ATT	0.361**	0.049	7.416	0.267	0.458	Supported
H4b	SI → PE	0.229**	0.052	4.363	0.127	0.333	Supported
H5a	UP → ATT	0.067	0.071	0.942	-0.074	0.202	Not supported
H5b	UP → PE	0.109	0.071	1.531	-0.034	0.244	Not supported
H6a	AV → ATT	0.024	0.067	0.362	-0.108	0.157	Not supported
H6b	AV → PE	0.094	0.073	1.285	-0.047	0.241	Not supported
H7	ATT → MCI	0.532**	0.056	9.491	0.417	0.636	Supported
H9	PE → MCI	0.212**	0.058	3.658	0.103	0.333	Supported

**p<0.01, *p< 0.05 level of significance

The bootstrapping procedure results show that seven out of 14 direct relationships are significant. Meaning ($\beta = 0.316$, $t = 5.730$, $p<0.05$) and social influence ($\beta = 0.361$, $t = 7.416$, $p<0.05$) significantly influences attitude towards M-payment among Malaysian. Furthermore, perceived enjoyment significantly affected by meaning ($\beta = 0.212$, $t = 3.522$, $p<0.05$), development ($\beta = 0.141$, $t = 2.063$, $p<0.05$), and social influence ($\beta = 0.229$, $t = 4.363$, $p<0.05$). Meanwhile, attitude towards M-payment ($\beta = 0.532$, $t = 9.491$, $p<0.05$) and perceived enjoyment ($\beta = 0.212$, $t = 3.658$, $p<0.05$) significantly influence M-payment continuance intention. H1a, H1b, H2b, H4a, H4b, H7 and H9 are supported.

Beyond statistical significance, the magnitude and theoretical relevance of the relationships were also considered. The strongest direct effect was observed for attitude towards M-payment on continuance intention ($\beta = 0.532$), indicating that users' overall evaluation of the mobile payment service plays a substantial role in shaping their intention to continue using it. In contrast, several significant relationships, such as development → perceived enjoyment ($\beta = 0.141$), demonstrated relatively weaker effect sizes, suggesting that although these relationships are statistically significant, their practical contribution to explaining users' behaviour is comparatively limited.

In contrast, the remaining hypothesized relationships (H2a, H3a, H3b, H5a, H5b, H6a, and H6b) are not supported, as indicated by p-values exceeding 0.05 and t-values below 1.96 in a two-tailed test. Additionally, the confidence interval bias shows that the intervals include zero, further supporting the lack of statistical significance. The specific findings are as follows: development ($\beta = 0.022$, $t = 0.351$, $p > 0.05$), ownership ($\beta = -0.022$, $t = 0.336$, $p > 0.05$), unpredictability ($\beta = 0.067$, $t = 0.942$, $p > 0.05$), and avoidance ($\beta = 0.024$, $t = 0.362$, $p > 0.05$) have no significant impact on attitude towards M-payment. In addition, perceived enjoyment is not significantly influenced by ownership ($\beta = 0.041$, $t = 0.493$, $p > 0.05$), unpredictability ($\beta = 0.109$, $t = 1.531$, $p > 0.05$), and avoidance ($\beta = 0.094$, $t = 1.285$, $p > 0.05$). Figure 4.2 below shows the bootstrapping results for the structural model's hypothesis testing.

These findings provide preliminary support for the theoretical assumptions underlying the study. Specifically, meaning and social influence appear to strengthen users' positive evaluations of mobile payment services, while meaning, development, and social influence enhance users' enjoyment during usage. In turn, both attitude and perceived enjoyment contribute to continuance intention, suggesting that cognitive evaluations and affective experiences are important determinants of sustained mobile payment usage. Conversely, the non-significant effects of ownership, unpredictability, and avoidance suggest that not all gamification drivers exert equal influence in the context of QR-code mobile payments. This may indicate that users perceive mobile payment primarily as a utilitarian payment tool rather than a platform that fosters possession, uncertainty, or fear-of-missing-out motivations. Detailed theoretical explanations for both the significant and non-significant relationships are presented in Chapter 5.

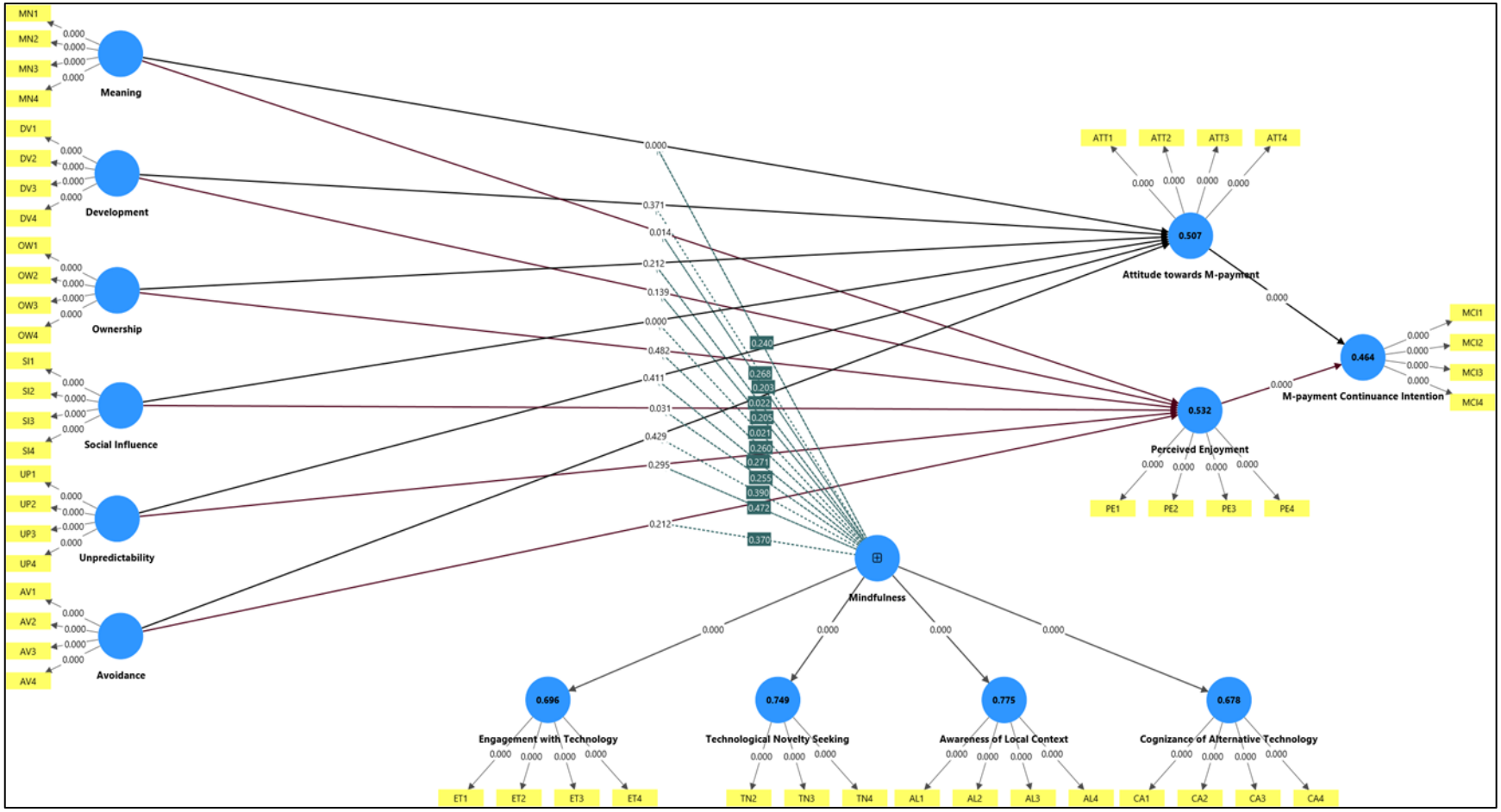

Figure 4.2 Bootstrapping Results for The Hypothesis Testing

4.6.2.3 Assessment of Coefficient of Determination

This study evaluates the model's predictive accuracy using the coefficient of determination (R^2). As described by Hair et al. (2017), R^2 serves as a measure of the model's predictive accuracy, reflecting the combined influence of exogenous variables on the endogenous variables. By calculating R^2, this study provides an objective measure of the model's robustness and its ability to predict m-payment continuance intention within the context of Malaysian users.

Table 4.17
Coefficient of Determination (R^2)

Endogenous construct	R^2
Attitude towards m-payment	0.423
M-payment continuance intention	0.463
Perceived enjoyment	0.428

The R^2 value represents the proportion of the total variation in the dependent variable that can be explained by the independent variables and mediators. Additionally, it indicates the percentage of the variation in the mediators that can be accounted for by the independent variables. As shown in Table 4.17, the R^2 value for m-payment continuance intention is 0.463, indicating that 46.3% of the variance in this dependent variable can be explained by attitude towards M-payment and perceived enjoyment. Additionally, the R^2 value for attitude toward m-payment is 0.423, signifying that 42.3% of the variance in this mediator is attributable to the independent variables (meaning, development, ownership, social influence, unpredictability, and avoidance). For perceived enjoyment, an R^2 value of 0.428 demonstrates that 42.8% of the variance can be explained by the independent variables.

These R^2 values are considered acceptable, as they exceed the threshold of 0.10 suggested by Falk and Miller (1992). This indicates that the variance explained by the independent variables and mediators is sufficient to account for the endogenous constructs within the model. Consequently, the results affirm the model's ability to capture meaningful relationships among the variables in the context of m-payment continuance intention.

4.6.2.4 Assessment of Effect Size

Next, this study evaluates the effect size of the predictor constructs using Cohen's f^2 statistic (Cohen, 1988). The f^2 statistic is a measure employed to determine the degree of the impact thatpredictor constructs have on the endogenous variable. By calculating effect size, the study assesses the relative contribution of each predictor construct to the explanatory power of the model. Larger f^2 values indicate a stronger effect, while smaller values suggest a more limited influence. Moreover, an f^2 value of 0.00 indicates that the predictor does not contribute to explaining any additional variance in the endogenous variable. Its inclusion in or removal from the model does not impact the R^2 value of the dependent variable (Hair et al., 2022).

Table 4.18
Effect Size Level

Exogenous construct	Endogenous construct	R^2	f^2	Effect level
Attitude towards M-payment	M-payment continuance intention	0.463	0.336	Moderate effect
Perceived Enjoyment			0.053	Weak effect
Meaning	Attitude towards M-payment	0.423	0.092	Weak effect
Development			0.000	No effect
Ownership			0.000	No effect
Social influence			0.138	Weak effect
Unpredictability			0.003	Very weak effect
Avoidance			0.000	No effect
Meaning	Perceived Enjoyment	0.428	0.042	Weak effect
Development			0.014	Very weak effect
Ownership			0.001	Very weak effect
Social influence			0.056	Weak effect
Unpredictability			0.007	Very weak effect
Avoidance			0.005	Very weak effect

Table 4.18 above presents the effect level of every exogenous construct. From the perspective of M-payment continuance intention as endogenous construct, attitude towards M-payment has moderate effect. Meanwhile, perceived enjoyment has a weak effect on M-payment continuance intention.

When attitude towards M-payment placed as the endogenous construct, both meaning and social influence exhibit weak effect while unpredictability portrays very weak effect. Development, ownership, and avoidance demonstrate no effect on this mediator. In terms of perceived enjoyment, development and social influence have weak impact. Additionally, meaning, avoidance, ownership and unpredictability demonstrate very weak effect. As previously

mentioned, an f^2 value of 0.02 or lower (including 0.00) is not necessarily a cause for concern. This aligns with the interpretation that if the path coefficient (relationship) is statistically non-significant, the effect size is expected to be minimal or zero, indicating that the predictor does not meaningfully contribute to explaining the variance in the dependent variable.

4.6.2.5 Assessment of the Predictive Relevance

Additionally, the blindfolding procedure was employed to evaluate the predictive relevance of the model, as proposed by Geisser (1975) and Stone (1974). This re-sampling technique systematically exclude and predicts specific indicator data points within the measurement model of the endogenous constructs. According to Hair et al. (2017) and Fornell and Cha (1994), a Q^2 value greater than 0 indicates that the model possesses predictive relevance for a particular endogenous construct. The result of predictive relevance is presented in table 4.19 below.

Table 4.19
Predictive Relevance

	Q^2predict	**PLS-SEM_RMSE**	**LM_RMSE**
ATT1	0.304	0.652	0.664
ATT2	0.341	0.604	0.628
ATT3	0.338	0.631	0.653
ATT4	0.268	0.665	0.691
MCI1	0.299	0.671	0.681
MCI2	0.287	0.649	0.665
MCI3	0.303	0.607	0.627
MCI4	0.277	0.626	0.648
PE1	0.302	0.721	0.741
PE2	0.331	0.672	0.684
PE3	0.347	0.676	0.692
PE4	0.317	0.706	0.730

Based on the result, all Q^2 values are surpassing 0, showing the model demonstrate sufficient predictive relevance. Therefore, RMSE is used to compare PLS-SEM and LM prediction. Since all indicators in PLS-SEM have lower values, it indicates higher predictive power than a simple linear model. This confirms that the PLS-SEM framework is better at capturing the complexity and relationships between constructs compared to the simpler linear model.

4.6.2.6 Summary of Assessment of the Structural Model

The evaluation of the structural model began with an assessment of lateral collinearity to ensure the robustness of the analysis. Using the Variance Inflation Factor (VIF), all independent variables and mediators demonstrated VIF values well below the threshold of 5, indicating that multicollinearity was not a concern. This step confirmed that the regression coefficients could be reliably interpreted and that the unique contributions of each predictor could be distinguished within the model.

Next, the significance and relevance of the hypothesized relationships were examined through bootstrapping procedures. Out of 14 direct hypotheses, only seven were found to have significant effects. Meaning and social influence indicated statistically significant relationship with attitude towards M-payment. Other than that, meaning, development, and social influence were proved to have significant impact on perceived enjoyment. Lastly, both mediators (attitude towards M-payment and perceived enjoyment) also portrayed to have significant relationship with M-payment continuance intention.

The remaining constructs did not show statistically significant relationships with the endogenous variable. The model's explanatory power was further supported by acceptable R^2 values for the endogenous constructs, indicating that a substantial proportion of variance in m-payment continuance intention, attitude towards m-payment, and perceived enjoyment could be explained by the model.

Finally, the effect size revealed that attitude towards mobile payment had a moderate effect on mobile payment continuance intention. Perceived enjoyment, meaning, and social influence each demonstrated weak effects on their respective endogenous constructs. In contrast, the remaining predictors including development, ownership, unpredictability, and avoidance exhibited negligible or no meaningful impact within the structural model. The predictive relevance of the model was confirmed using the blindfolding procedure, where all Q^2 values exceeded zero, and the PLS-SEM approach demonstrated superior predictive power compared to a simple linear model. Collectively, these findings affirm the structural model's validity, highlighting the central roles of social influence and attitude towards m-payment in predicting continuance intention within the Malaysian context.

4.6.3 Analysis of Mediating Effect

Mediation is a specific type of "indirect effect" that relies heavily on strong theoretical or conceptual foundations. These foundations are essential for identifying meaningful mediation effects (Hair et al., 2017; Preacher & Hayes, 2012). This section focuses solely on evaluating the significance of the mediating relationship.

The Sobel test (1982), which relies on the assumption of a normal distribution, is a common method for testing mediating effects. However, Preacher and Hayes (2004; 2008) have pointed out that while the path coefficient may follow a normal distribution, the indirect effect typically does not. This discrepancy affects the accuracy of "standard errors," making the Sobel test unreliable and potentially leading to incorrect conclusions.

Hair et al. (2013) emphasized the usefulness of bootstrapping for mediation analysis, recommending researchers follow (Preacher & Hayes, 2004). Bootstrapping involves resampling the distribution of the indirect effect and is effective for both simple and multiple mediator models. This approach is well-suited for PLS-SEM because it does not rely on assumptions about the distribution of variables or the sampling distribution of the statistics. Additionally, it is applicable even with small sample sizes (Hair et al., 2017; Preacher & Hayes, 2008).

This study examined how attitudes toward m-payment and perceived enjoyment act as mediators between the independent variables (meaning, development, ownership, social influence, unpredictability, and avoidance) and m-payment continuance intention. The results of the mediation analysis are shown in Table 4.20 below.

Table 4.20
Hypotheses Testing on Mediation

Hypothesis	Relationship	Coefficient (β)	Std error	t-value	Confidence interval		Decision
					2.5%	97.5%	
H8a	MN → ATT → MCI	0.168**	0.034	4.928	0.116	0.229	Supported
H8b	DV → ATT → MCI	0.012	0.034	0.347	-0.042	0.070	Not supported
H8c	OW → ATT → MCI	-0.012	0.035	0.332	-0.069	0.045	Not supported
H8d	SI → ATT→ MCI	0.192**	0.037	5.25	0.137	0.257	Supported
H8e	UP → ATT → MCI	0.035	0.038	0.929	-0.025	0.101	Not supported
H8f	AV → ATT → MCI	0.013	0.036	0.36	-0.047	0.072	Not supported
H10a	MN → PE→ MCI	0.045**	0.017	2.71	0.023	0.081	Supported
H10b	DV → PE→ MCI	0.03*	0.018	1.659	0.007	0.067	Supported
H10c	OW → PE→ MCI	0.009	0.018	0.477	-0.018	0.043	Not supported
H10d	SI → PE → MCI	0.049**	0.019	2.57	0.024	0.088	Supported
H10e	UP → PE→ MCI	0.023	0.017	1.344	0.001	0.059	Not supported
H10f	AV → PE→ MCI	0.02	0.016	1.271	-0.002	0.051	Not supported

**p<0.01, *p< 0.05 level of significance

For mediation analysis, one-tailed tests are necessary because of the way the hypotheses are formulated. In this approach, t-values are significant if they exceed 1.645, and p-values must be less than 0.05. Additionally, the analysis requires testing the 95% bootstrapped confidence interval bias.

The bootstrapping analysis revealed that only five out of the 12 indirect effects were significant: H8a, H8d, H10a, H10b, and H10d. Attitude towards mobile payment significantly mediates the relationship between meaning and M-payment continuance intention ($\beta = 0.168$, $t = 4.928$, $p < 0.05$). Furthermore, attitude towards mobile payment also significantly mediates the relationship between social influence and M-payment continuance intention ($\beta = 0.192$, $t = 5.25$, $p < 0.05$). In terms of perceived enjoyment, this mediator significantly mediates the link between meaning ($\beta = 0.045$, $t = 2.71$, $p < 0.05$), development ($\beta = 0.03$, $t = 1.659$, $p < 0.05$), and social influence ($\beta = 0.049$, $t = 2.57$, $p < 0.05$) with M-payment continuance intention. The 95% bootstrapped confidence intervals for the indirect effects did not include zero, thus, confirming the presence of mediation (Preacher & Hayes, 2004, 2008). These results provide evidence that meaning and social influence are related to M-payment continuance intention indirectly through attitude towards M-payment, while meaning, development, and social influence have relationship with continuance intention indirectly through perceived enjoyment. Since the direct paths from the exogenous constructs to continuance intention were not specified in the proposed model, the results are interpreted as evidence of significant indirect-only mediation rather than full or partial mediation.

In contrast, the remaining hypothesized relationships (H8b, H8c, H8e, H8f, H10c, H10e and H10f) were not supported, as indicated by p-values exceeding 0.05 and t-values below 1.645 in a one-tailed test. Additionally, the confidence interval bias shows that the intervals include zero, further supporting the lack of statistical significance. These results suggest that attitude towards m-payment does not significantly mediate the relationships between development, ownership, unpredictability, and avoidance with m-payment continuance intention. In terms of perceived enjoyment, this mediator also does not significantly mediate the relationships between ownership, unpredictability and avoidance with m-payment continuance intention.

4.6.4 Analysis of Moderating Effect

A moderator variable is a third factor that influences the relationship between an exogenous variable and an endogenous variable. It affects the strength or direction of this relationship, depending on the moderator's level or value (Holmbeck, 1997). In simpler terms, the moderator interacts with the exogenous in a way that impacts the endogenous. This study follows the framework outlined by Hair et al. (2017) to conduct a moderation analysis. Figure 4.3 illustrates the steps for creating an interaction term.

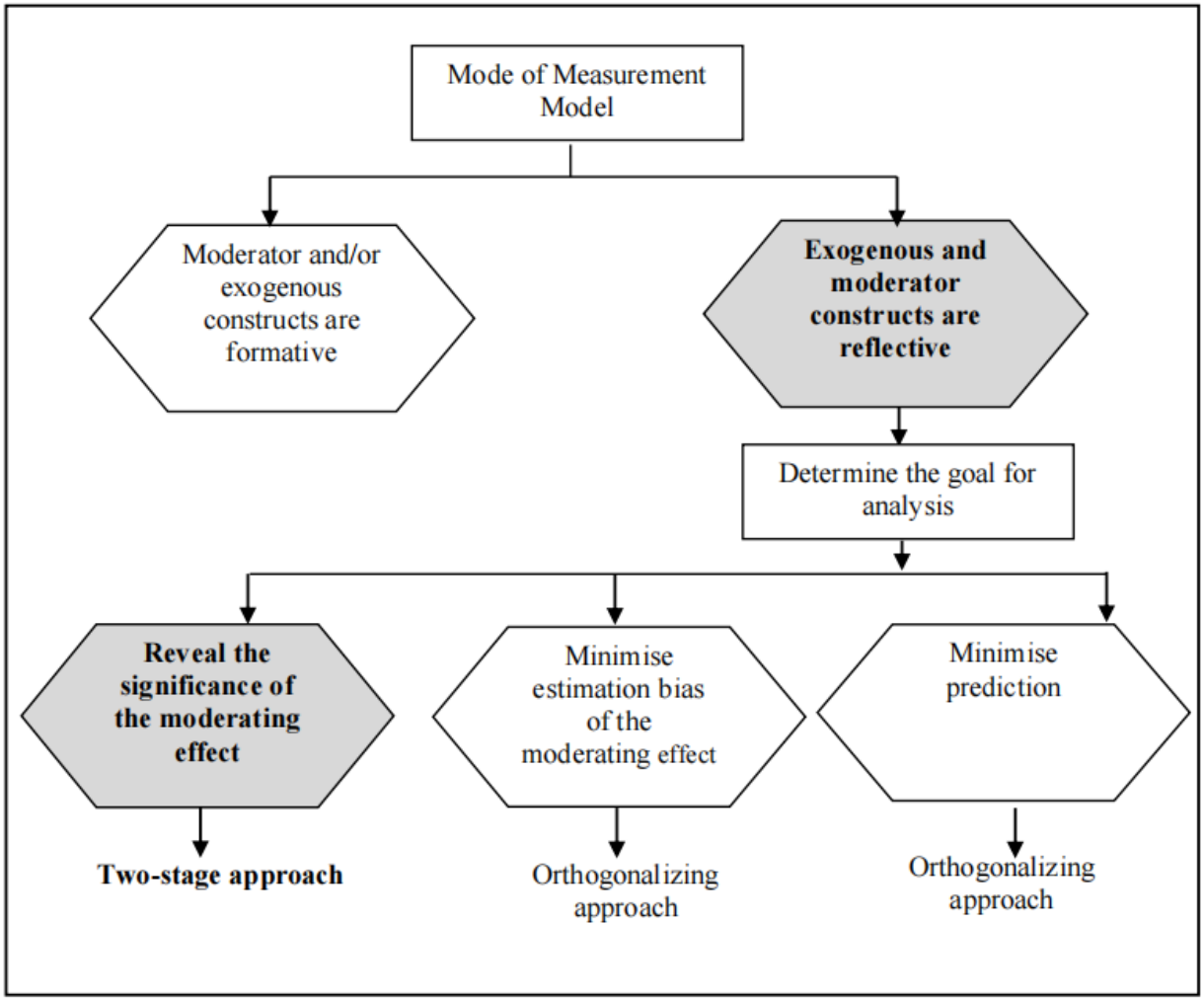

Figure 4.3 Guidelines for Creating the Interaction Term (Hair et al., 2017)

This research evaluates the moderator variable by considering both measurement and structural model criteria. The moderator variable must meet the standards for internal consistency

reliability, convergent validity, and discriminant validity. This study employed a two-stage approach to evaluate the moderator variable. Henseler and Chin (2010) suggested that this approach is appropriate when formative measures are used. However, contrary to Fassott et al. (2016) and Chin et al. (2003), the two-stage approach can also be applied to interaction effect models involving reflective indicators. Hair et al. (2017) and Henseler and Chin (2010) support this, emphasizing that the choice of method for creating an interaction term depends on the specific objectives of the analysis.

Mindfulness (second-order construct) is examined to identify its impact the relationship between the exogenous and endogenous constructs. A two-stage approach is preferred for this analysis, as it provides more accurate estimates of individual effects and offers greater statistical power. The hypotheses H11a to H11f and H12a to H12f were tested to conduct the moderation analysis. To evaluate the moderation effects, this research followed several steps, outlined as follows:

Step 1: Analysis of coefficient of determination → (R^2) change
Step 2: Analysis of significant test using bootstrapping
Step 3: Interaction plot

4.6.4.1 Moderating Effect of Mindfulness in the Relationship between Gamification Elements and Attitude Towards M-payment

H11a: The moderating effect of mindfulness on the relationship between meaning and attitude is more positive for people with a high level of mindfulness.

H11b: The moderating effect of mindfulness on the relationship between development and attitude is more positive for people with a high level of mindfulness.

H11c: The moderating effect of mindfulness on the relationship between ownership and attitude is more positive for people with a high level of mindfulness.

H11d: The moderating effect of mindfulness on the relationship between social influence and attitude is more positive for people with a high level of mindfulness.

H11e: The moderating effect of mindfulness on the relationship between unpredictability and attitude is more positive for people with a high level of mindfulness.

H11f: The moderating effect of mindfulness on the relationship between avoidance and attitude is more positive for people with a high level of mindfulness.

Step 1: Analysis of Coefficient of Determination → (R^2) change

In assessing moderation analysis, the change in R^2 is a critical factor. This research evaluates the R^2 change from the main effect model. As shown in Table 4.24, the inclusion of mindfulness leads to a notable change. In the main effect model, the R^2 is 0.423, whereas in the interaction model, the R^2 increases to 0.507. The R^2 change of 0.084 indicates that adding one interaction term results in an approximately 8.4% improvement in explanatory power.

Table 4.21
R^2 Change in Attitude Towards M-payment

Endogenous construct	R^2	R^2 Change	% of Change
Attitude towards m-payment	0.423	0.507	0.084 (8.4)

Step 2: Analysis of Significant Test Using Bootstrapping

For moderating analysis, one-tailed tests are necessary because of the way the hypotheses are formulated. In this approach, t-values are significant if they exceed 1.645, and p-values must be less than 0.05. Additionally, the analysis requires testing the 95% bootstrapped confidence interval bias. The bootstrapping analysis revealed that only two out of the six moderate effects was significant, H11c ($\beta = 0.166$, $t = 2.004$, $p < 0.05$) and H11d ($\beta = -0.104$, $t = 2.021$, $p < 0.05$).

Therefore, the moderating effect of mindfulness on the relationships between ownership and attitude towards m-payment is more positive for people with a high level of mindfulness can be considered. However, for social influence, the actual interaction effect is negative (-0.104) which indicates higher mindfulness weakens the positive effect of social influence on attitude towards m-payment. Even though the effect is statistically significant, it is in the opposite direction of prior prediction. Hence, H11d is not supported.

The remaining hypothesized relationships (H11a, H11b, H11e, and H11f) are not supported, as indicated by p-values exceeding 0.05 and t-values below 1.645 in a one-tailed test. Additionally, the confidence interval bias shows that the intervals include zero, further supporting the lack of statistical significance.

In terms of effect size, the analysis shows that the f^2 values for the interaction terms were H11a (0.002), H11b (0.002), H11c (0.013), H11d (0.011), H11e (0.002), and H11f (0.000). These values provide additional insight into the contribution of the moderating effects of mindfulness across the tested relationships.

Table 4.22
Significant Effect of Mindfulness Towards the link between Gamification Elements and Attitude Towards M-payment

Hypothesis	Relationship	Coefficient (β)	Std error	t-value	f2	p-value	Decision
H11a	MN*MIND → ATT	0.047	0.067	0.706	0.002	0.240	Not supported
H11b	DV*MIND → ATT	-0.052	0.084	0.619	0.002	0.268	Not supported
H11c	OW*MIND → ATT	0.166	0.083	2.011	0.013	0.022	Supported
H11d	SI*MIND → ATT	-0.105	0.052	2.025	0.011	0.021	Not supported
H11e	UP*MIND → ATT	-0.058	0.095	0.609	0.002	0.271	Not supported
H11f	AV*MIND → ATT	-0.023	0.080	0.280	0.000	0.390	Not supported

*Note: MN=meaning; DV=development; OW=ownership; SI=social influence; UP=unpredictability; AV=avoidance; MIND=mindfulness; ATT=attitude towards m-payment

Step 3: Interaction plot

Additionally, this research followed the procedures outlined by Dawson (2014) due to the complexity and specific nature of the effect. Simply examining the coefficients alone does not provide a clear understanding. To address this, an interaction plot was created. The interpretation of these plots focuses on analyzing the slope gradients.

As shown in Figure 4.4, the red line (low mindfulness) slopes downward, while the green line (high mindfulness) slopes upward. Although the red line is steeper, it indicates a negative relationship. The interaction plot suggests that for individuals with high mindfulness, ownership has a positive effect on attitudes toward mobile payment. In contrast, for those with low mindfulness, ownership is negatively related to attitude. This finding confirms a significant positive moderation effect ($\beta = 0.166$, $p < 0.05$), supporting Hypothesis H11c. This means that mindfulness strengthens the positive influence of ownership on user attitudes.

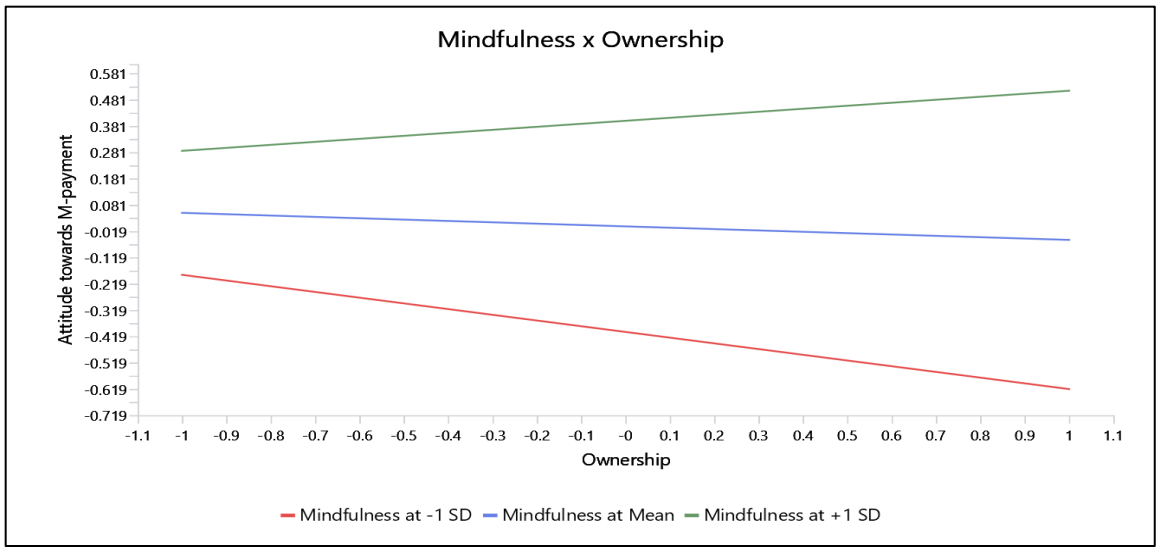

Figure 4.4 The Interaction Result for the Significant Effect of Mindfulness on the link between Ownership and Attitude towards M-payment

According to Figure 4.5 below, the red line is again steeper as compared to the green line, The interaction plot shows that as mindfulness increases, the impact of social influence on attitude decreases. This confirms a significant but negative moderation effect. Hence, while the interaction term is significant ($\beta = -0.105$, $p < 0.05$), it is in the opposite direction of H11d. Therefore, H11d is not supported.

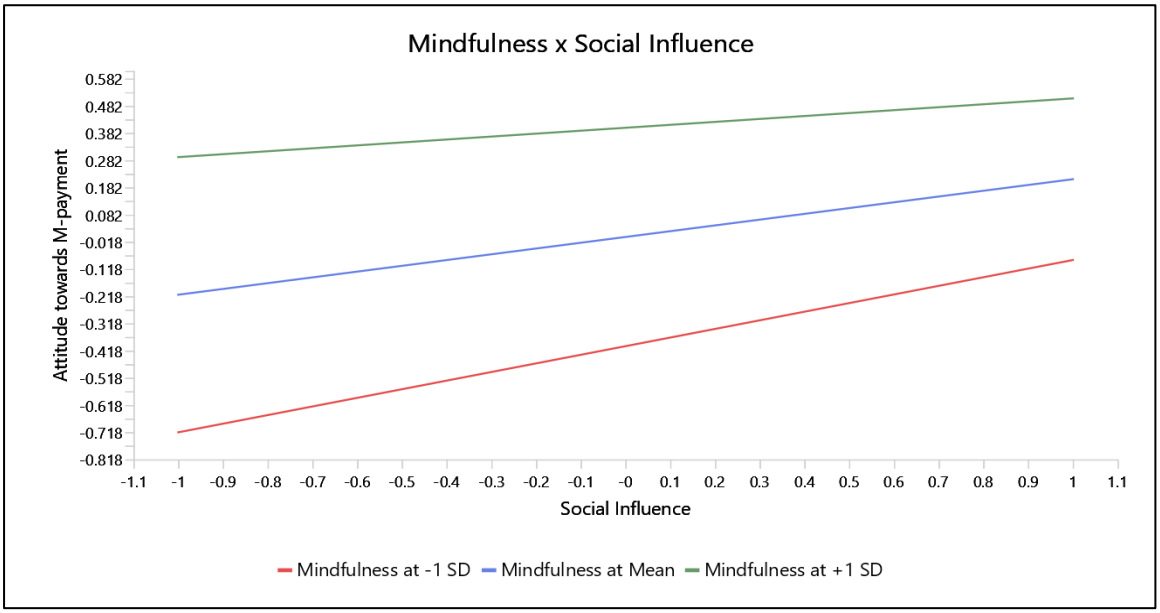

Figure 4.5 The Interaction Result for the Significant Effect of Mindfulness on the link between Social influence and Attitude Towards M-payment

4.6.4.2 Moderating effect of Mindfulness in the Relationship between Gamification elements and Perceived Enjoyment

H12a: The moderating effect of mindfulness on the relationship between meaning and perceived enjoyment is more positive for people with a high level of mindfulness.

H12b: The moderating effect of mindfulness on the relationship between development and perceived enjoyment is more positive for people with a high level of mindfulness.

H12c: The moderating effect of mindfulness on the relationship between ownership and perceived enjoyment is more positive for people with a high level of mindfulness.

H12d: The moderating effect of mindfulness on the relationship between social influence and perceived enjoyment is more positive for people with a high level of mindfulness.

H12e: The moderating effect of mindfulness on the relationship between unpredictability and perceived enjoyment is more positive for people with a high level of mindfulness.

H12f: The moderating effect of mindfulness on the relationship between avoidance and perceived enjoyment is more positive for people with a high level of mindfulness.

Step 1: Analysis of coefficient of determination → (R^2) change

When examining perceived enjoyment, the evaluation of R^2 change highlighted a substantial improvement in the model's explanatory power. In the original main effect model, the R^2 value was 0.428, indicating the proportion of variance in perceived enjoyment that could be explained by the predictors. However, after integrating mindfulness as a moderating factor, the R^2 value increased to 0.532 in the interaction model. This change in R^2 represents a difference of 0.104, signifying a notable enhancement in the model's ability to account for variance.

This improvement translates to an approximate 10.4% increase in explanatory power due to the inclusion of the interaction term. This highlights the added value of incorporating interaction effects in analyzing complex relationships.

Table 4.23
R^2 Change in Perceived Enjoyment

Endogenous construct	R^2	R^2 Change	% of Change
Perceived enjoyment	0.428	0.532	0.104 (10.4)

Step 2: Analysis of significant test using bootstrapping

The findings revealed that all moderation effects in H12a to H12f were insignificant. In each case, the p-values exceeded 0.05 and the t-values were below the one-tailed threshold of 1.645. Furthermore, the confidence interval bias confirmed that zero was included within the interval range, providing additional evidence that mindfulness did not moderate the tested relationships with perceived enjoyment.

Specifically, the interaction between meaning and mindfulness was not significant (H12a: $\beta = 0.043$, $t = 0.833$, $p > 0.05$, $f^2 = 0.002$), while the interaction between development and mindfulness also failed to reach significance (H12b: $\beta = -0.059$, $t = 0.825$, $p > 0.05$, $f^2 = 0.002$). Similarly, ownership with mindfulness (H12c: $\beta = 0.052$, $t = 0.644$, $p > 0.05$, $f^2 = 0.001$) and social influence with mindfulness (H12d: $\beta = -0.033$, $t = 0.658$, $p > 0.05$, $f^2 = 0.001$) were not significant. Unpredictability (H12e: $\beta = -0.006$, $t = 0.070$, $p > 0.05$, $f^2 = 0.000$) and avoidance (H12f: $\beta = -0.027$, $t = 0.333$, $p > 0.05$, $f^2 = 0.000$) also showed no significant interaction effects.

Taken together, these results indicate that mindfulness does not moderate the relationships between the proposed factors and perceived enjoyment, as none of the hypothesized effects were supported.

Table 4.24
Significant effect of mindfulness towards the link between gamification elements and perceived enjoyment

Hypothesis	Relationship	Coefficient (β)	Std error	t-value	f^2	p-value	Decision
H12a	MN*MIND → PE	0.043	0.052	0.833	0.002	0.203	Not supported
H12b	DV*MIND → PE	-0.059	0.071	0.825	0.002	0.205	Not supported
H12c	OW*MIND → PE	0.052	0.081	0.644	0.001	0.260	Not supported
H12d	SI*MIND → PE	-0.033	0.050	0.658	0.001	0.255	Not supported
H12e	UP*MIND → PE	-0.006	0.081	0.070	0.000	0.472	Not supported
H12f	AV*MIND → PE	-0.027	0.081	0.333	0.000	0.370	Not supported

*Note: MN=meaning; DV=development; OW=ownership; SI=social influence; UP=unpredictability; AV=avoidance; MIND=mindfulness; PE=perceived enjoyment

Step 3: Interaction plot

According to Dawson (2014) and Aiken and West (1991), interaction plots help clarify the nature and direction of moderation effects, making it easier to understand and identify patterns, including non-linear or unexpected trends. These plots also support hypothesis testing by comparing slopes at different levels of the moderator, effectively communicating findings in a clear and intuitive way. However, interaction plots are generally unnecessary for insignificant relationships because they are intended to visualize meaningful moderation effects. When the moderation effect is statistically insignificant, the plots typically show overlapping or nearly parallel lines, providing little additional value (Aiken & West, 1991; Hair et al., 2017). Furthermore, presenting interaction plots for insignificant findings could be misleading, as readers might infer patterns without statistical support (Dawson, 2014), and it may clutter the report. Since the previous analysis found no significant effect of mindfulness on the relationship between gamification elements and perceived enjoyment, an interaction plot is not required.

4.6.4.3 Summary of Structural Model for Moderating Analysis

The study examined whether mindfulness moderates the relationship between gamification elements and two outcomes: attitude toward mobile payment (M-payment) and perceived enjoyment. For attitude, the inclusion of mindfulness as a moderator increased the model's explanatory power by 8.4%. Among the relationships tested, the moderation of mindfulness on the link between ownership ($\beta=0.166$, $t=2.011$, $p<0.05$) with attitude towards m-payment was statistically significant. Hence, H11c is supported.

For perceived enjoyment, the addition of mindfulness as a moderator increased the model's explanatory power by 10.4%. Despite this, all moderating effects were statistically insignificant. Consequently, none of the hypotheses related to mindfulness moderating the relationship between gamification elements and perceived enjoyment were supported.

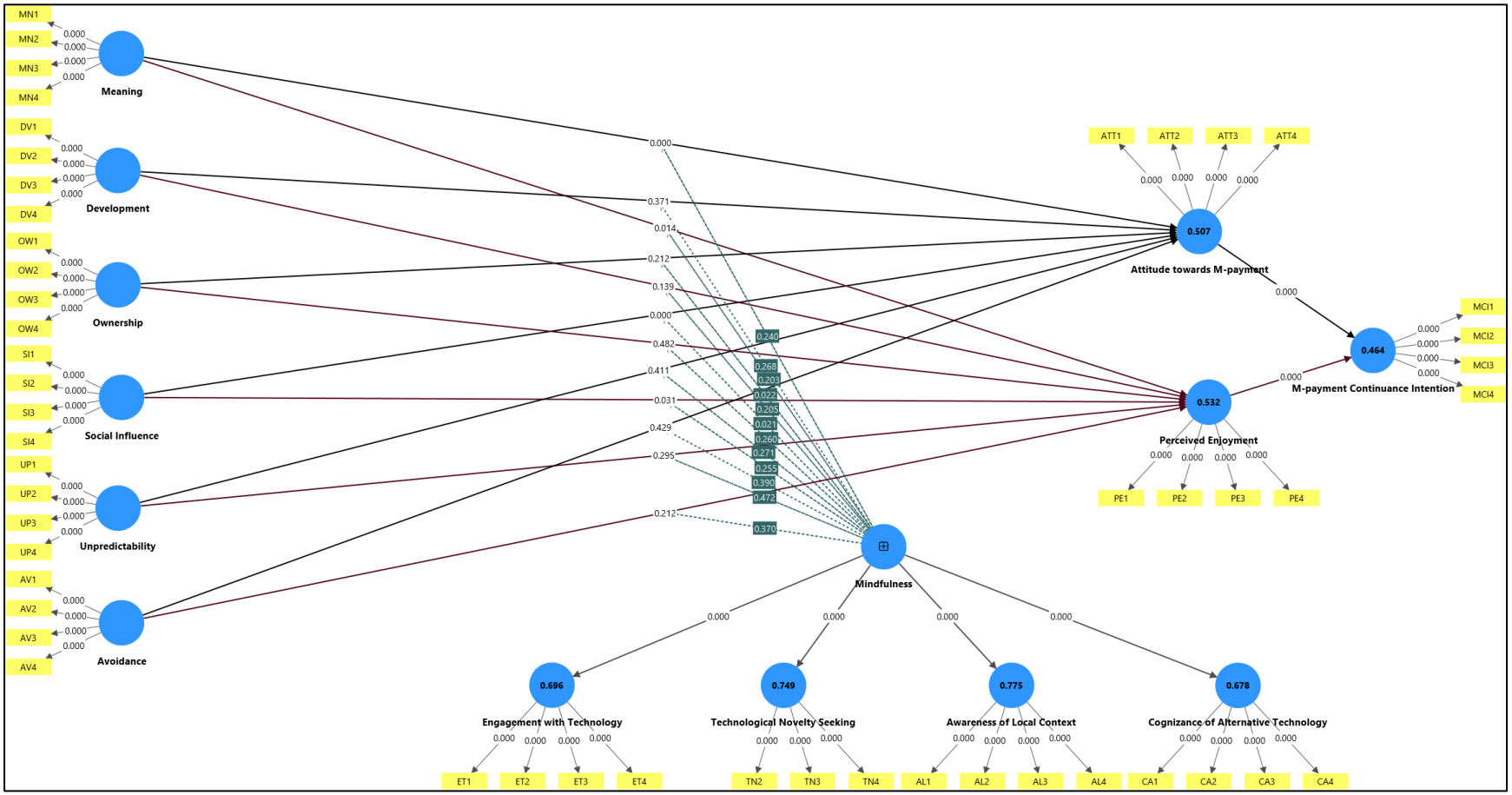

Figure 4.6 Structural Model for Moderating Analysis

4.7 Conclusions

This study showed that the measurement model is reliable and valid. All constructs had strong internal consistency with values above 0.7, and most indicators had loadings above 0.708. After removing one weak item (TN1), the Average Variance Extracted (AVE) value improved and it ranged from 0.627 to 0.814, confirming good convergent validity. Discriminant validity was also supported as each construct's indicators loaded higher on their own construct than on others, and the HTMT confidence intervals did not include 1.

In testing the direct effects, H1a, H1b, H2b, H4a, H4b, H7 and H9 are supported which significant at $p < 0.05$. Meaning and social influence significantly influenced attitude towards mobile payments among Malaysian users. On the other hand, meaning, development, and social influence significantly affected perceived enjoyment. Moreover, both mediators were also significantly influenced m-payment continuance intention. Meanwhile, the rest of hypotheses (H2a, H3a, H3b, H5a, H5b, H6a, and H6b) were not supported as they showed no significant direct effects. The model explained a meaningful amount of variance in continuance intention, attitude, and perceived enjoyment, with R^2 values supporting its explanatory power.

Mediation analysis found that attitude towards mobile payment significantly mediated the relationship between meaning with continuance intention and between social influence with continuance intention. In terms of perceived enjoyment, it mediated the link between meaning, development, and social influence with m-payment continuance intention. Therefore, there five out of 12 indirect effects were significant with $p<0.05$.

Finally, mindfulness was tested as a moderator of the relationships between gamification elements and both attitude and perceived enjoyment. Including mindfulness improved the explained variance in attitude by 8.4% and perceived enjoyment by 10.4%. Yet, only the moderation of mindfulness on the ownership-attitude and social influence-attitude relationships were significant, and surprisingly, only H11c (ownership X mindfulness-attitude) was supported. No moderation effects were significant for perceived enjoyment.

CHAPTER 5
DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter presents the conclusion of the study, with a primary focus on addressing the Research Objectives and Research Questions. In addition, recommendations are offered to guide future research related to this topic. Both the conclusions and recommendations are derived from the findings discussed in the previous chapter. Based on the results, seven out of the fourteen proposed direct effect hypotheses were supported. Regarding the mediating effects, five hypotheses were confirmed: two through attitude towards mobile payment and three through perceived enjoyment. As for the moderating role of mindfulness, only one out of six hypothesized effects on the relationship between gamification and attitude towards mobile payment was supported. However, no support was found for the moderating effect of mindfulness on the relationship between gamification and perceived enjoyment.

5.2 Discussion

To conclude this study, a detailed discussion is provided to further elaborate on the findings reported in the previous chapter. Additionally, the results are examined in relation to prior research, with justifications offered to explain the observed outcomes

5.2.1 Research Objective 1 and Research Question 1

Research objective	Research question
To identify the impact of the octalysis gamification factors on users' attitude and perceived enjoyment, and how these factors subsequently affect continuance intention in mobile payment services in Malaysia during the post-endemic phase of COVID-19.	Do octalysis gamification factors have impact on users' attitude and perceived enjoyment, which in turn affect their continuance intention towards mobile payment services in Malaysia during the post-endemic phase of Covid-19?

Research Question 1 was formulated to identify the direct effects of octalysis gamification drivers on users' attitudes toward mobile payment and their perceived enjoyment. In addition, this question also explores how attitude and perceived enjoyment directly influence users' continuance intention of m-payment usage. To

address this research question and achieve the related objective, the discussion begins by dividing this section into three parts: 1) the relationship between octalysis gamification and attitude towards m-payment; 2) the link between octalysis gamification and perceived enjoyment; 3) the direct effects of both attitude and perceived enjoyment with m-payment continuance intention.

5.2.1.1 Gamification and Attitude Towards M-payment

According to the findings, meaning (epic meaning and calling) was found to be significant in affecting attitude towards m-payment (H1a). In the era of post-endemic Covid-19, people are starting to see the contactless payment system not only as a convenience but also as a public health necessity. As compared to cash transactions, which are often perceived as less hygienic due to physical handling, QR-code-based mobile payments provide a safer and contactless alternative.

Prior studies also highlight that QR payments are perceived as faster and more convenient than traditional options such as cards or mobile banking (Chauhan, 2021; Shaikh, Glavee-Geo, & Karjaluoto, 2020). Furthermore, QR-code payment systems are particularly advantageous for micro and small merchants who often lack access to full banking infrastructure or expensive point-of-sale terminals, as they require only a smartphone and a printed code to operate (Rafi, Othman, & Yusof, 2022). In many countries, including Malaysia, QR-code m-payment helps small businesses in rural areas participate in the digital economy, which subsequently enhances socioeconomic equality.

Based on the result, it can be implied that users may think that using QR-code m-payment can lead to better societal goals and promote national progress, which in turn helps post-pandemic recovery. These factors trigger the users to shape a positive attitude towards m-payment due to a sense of purpose that elevates emotional attachment and intrinsic motivation. This reflects the influence of meaning, which portrays the users' desire to be part of something bigger than themselves, since they are more likely to view QR-code m-payment not merely as a convenient tool, but as a meaningful behavior aligned with personal values and societal benefit.

In a study by Hassan et al. (2021), they found that perceived societal benefit plays an important role in users' attitude and intention toward m-payment during the outbreak of Covid-19, as the users see their participation as having a favorable impact

on public health and economic resilience. This is also supported by Prakash and Manchanda (2021), who suggested that if digital platforms (such as QR-code m-payment systems) have meaningful and altruistic narratives, users have a tendency to form a favorable attitude and engagement. This is because they view their usage as a societal purpose, not only as a way to perform a transaction.

Besides, social influence is found to be consequential in influencing attitude towards m-payment (H4a). Malaysian users nowadays have adapted to digital technology that provides convenience, safety, and social connectivity. Contrary to traditional digital payment methods and cash, the QR-code m-payment system commonly offers gamified incentives, for instance, rewards, cashback, or referral bonuses. These features usually attract users' social circles via social media or in-app activity updates.

Two examples in Malaysia: Bank Islam Go-app provides DuitNow QR service with a no-fee model since 2024 (the post-endemic phase of Covid-19). Although it is not reward-focused, it helps to promote QR-code m-payment usage and encourage social acceptance. Meanwhile, Touch 'n' Go e-wallet offers cashback, referral bonuses, and 'Scan & Win' rewards, frequently shared through social media, which reinforce peer influence. Therefore, users are more likely to have positive attitudes as they witness influencers and friends receive benefits from these apps. Since Malaysia has a collectivist society, people are more likely to adjust their attitude or action to gain approval (Ang & Liang, 2021). Such situations actually encourage the desire for QR-code m-payment rather than other alternatives that are less socially interactive. Prakash and Mohanty (2023) had previously found that users' attitude and continuance intention toward digital payment can be increased when gamification is embedded with peer influence. Likewise, Suo et al. (2022) indicated that in Malaysia, social influence was a crucial factor in users' favorable attitude towards QR-based m-payment, particularly in the post-COVID phase.

However, four relationships are found insignificant which are between development, ownership, unpredictability and avoidance with attitude towards M-payment. Malaysia's post-endemic COVID-19 era has witnessed QR-code M-payment becoming ubiquitous and employed for daily transactions, resulting in limited opportunity for users' personal development to affect their attitude towards the app (Yan et al., 2022). Now that QR-code M-payment has become ordinary, it has reduced the novelty and sense of personal growth it once carried. The ease of use of the QR-code

method has caused fewer opportunities for skill mastery or specific achievement, because QR codes make everything fast and automated, users don't get the chance to practice the more complicated skills that they used to need before such as cognitive or accuracy-related skills (Yan et al., 2022).

As mentioned before, users' attitudes are motivated by practical benefits and gamified incentives, which remain extrinsic in nature and are inadequate to stimulate the intrinsic satisfaction related to development in gamification theory. This justification matches research from Bangladesh (Islam et al., 2024), which proposed that performance expectancy, effort expectancy, and social influence significantly influence users' attitude, while drivers related to self-concept and intrinsic motivation are negligible. These justifications support and suggest that user's approach QR-code M-payments primarily as practical tools rather than arenas for personal growth or mastery, hence why H2a was not supported.

Referring to H3a, which is not supported, ownership does not have an impact on attitude towards m-payment in the post-endemic COVID-19 context. This may be explained by the transactional and utility-driven nature of QR-code m-payment, which became widespread during the pandemic as a hygienic and contactless alternative to cash or NFC tap-and-pay (Pal et al., 2021; Kaur et al., 2021). In the Octalysis framework, ownership is considered a powerful driver when users feel a sense of control, exclusivity, and customization over a product or service (Chou, 2014; Koivisto & Hamari, 2019).

However, QR-code m-payment systems typically have standardized features and provider-controlled settings with only basic personalization, which reduces opportunities for users to develop a sense of possessiveness (Liébana-Cabanillas et al., 2019; Zhou, 2014). Moreover, the interoperability of QR codes across multiple e-wallets further diminishes exclusivity, as the same code can be used with different apps, leading users to perceive limited control and uniqueness in their payment experience (Ozili, 2022; Yan & Yang, 2021).

Attitudes are often found to be affected by advantages such as transaction speed, convenience, or incentives like cashback or promotions (Brito et al., 2018; Lehdonvirta et al., 2009). This is supported by Chong et al. (2024), who found several factors influencing QR m-payment: ease of use, social influence, promotional benefits, perceived usefulness, and privacy/security. Similar suggestions were presented by Chuah et al. (2024), with the additional finding that privacy-related risk affects

perceived value. Combining these studies, none of the studies found ownership to have a significant effect on attitude towards m-payment. They also proposed that cash is tangible and must be physically possessed to be owned, which naturally fosters ownership. In contrast, QR-code m-payment attitudes are formed predominantly by trust-related factors rather than a sense of possession.

Moreover, the findings proposed that unpredictability does not have an impact on attitude towards M-payment in Malaysia's post-endemic phase (H5a). Since the outbreak of COVID-19, QR-code M-payment has been noticed, and its usage has now become a daily choice of payment transaction by Malaysians in the post-endemic phase. QR-code M-payment has gradually moved beyond its initial novelty stage and has become a familiar and routine payment method among Malaysian users. In financial settings, especially at certain phases, users prefer to prioritize other elements such as reliability, security, and speed over surprise, curiosity, or novelty.

While m-payment providers employ gamified elements, this is still supplementary to the digital payment's actual function and has less effect on forming attitudes. There is previous research that supports this finding, suggesting that motivational drivers rooted in unpredictability or curiosity do not significantly affect users' attitudes towards digital payment systems. Proposed by Ruslim and Herwindiati (2024), attitude towards e-wallets among Gen X was found to have no meaningful impact attributable to intrinsic curiosity or novelty-seeking motivations, and was only influenced by compatibility, security, perceived ease of use, and health concerns. Furthermore, Shetu et al. (2022) suggested that perceived technological innovativeness (a construct closely tied to curiosity and novelty) had no significant effect on continuous usage intentions for digital wallets in Bangladesh.

In regards to the non-significant relationship between avoidance and attitude towards m-payment (H6a), it might occur because positive attitude is more likely affected by positive factors such as social influence and meaning, which are less connected to avoidance (Kamarulzaman, 2023). If compared to other alternatives of payment, QR-code payment stands out in terms of ease of use and speed. Avoidance of potential losses, whether in terms of convenience, security, or risk, often serves as a maintenance factor. Even users who do not have strong positive feelings toward QR-code mobile payments may continue using them to avoid perceived negative outcomes (Alhassan & Butler, 2021). Over time and especially moving into the post-COVID-19

era, repeated usage leads to habit formation, which reduces the influence of avoidance motivations.

As QR-code payment systems become more familiar and embedded in routine transactions, the fear of missing out or tolerating inconvenience tends to decline because users perceive greater security, ease of use, and convenience (Sehat, Daud, Ahmad, Suhaime & Jogeran, 2024; Huddin & Ikhsan, 2022). Thus, the effect of avoidance on attitude fades out. The users no longer feel strong emotions that help to form their attitude significantly. Ahmad and Khan (2021) have said that avoidance of risk may have an impact on continuance usage; drivers such as perceived ease of use or transaction speed are better motivators of users' attitude. Similarly, a study by Putri and Wulandari (2020) emphasized that even though avoidance of losses may maintain behavior, it does not significantly encourage attitudes, which are better influenced by perceived value and simplicity of the service.

Collectively, these non-significant findings suggest that QR-code mobile payment is primarily perceived as a utilitarian, routine, and low-involvement technology. Unlike gaming, social media, or entertainment applications, users engage with QR-code mobile payment mainly to complete transactions efficiently and securely. Consequently, gamification drivers associated with personal growth (development), psychological attachment (ownership), curiosity (unpredictability), and loss avoidance are less influential in shaping users' attitudes. Instead, users appear to respond more strongly to drivers that provide immediate social relevance and meaningful purpose, namely meaning and social influence. This finding indicates that the effectiveness of gamification drivers may be highly context-dependent and that not all Octalysis drivers are equally applicable in financial technology settings.

5.2.1.2 Gamification and Perceived enjoyment

Regarding the link between six gamification core drivers and perceived enjoyment, only three relationships were found to be significant: H1b, H2b, and H4b. First, meaning's role in boosting perceived enjoyment of QR-code M-payment (H1b). While users are healing from the pandemic, many try to search for purpose and meaning in everyday efforts, including their actions in payment transactions. They feel more intense intrinsic satisfaction, not just a feeling of convenience, when they see that their QR-code M-payment usage contributes to a wider societal purpose (Yan et al., 2022).

This sense of meaningful contribution sparks an emotion that changes daily M-payment transactions into purposeful activity, raising users' perceived enjoyment (Lu et al., 2021). Unlike cash and other digital payment methods, QR-code payment transactions are usually more societal-driven and encourage local merchant participation (especially small or micro vendors) in using digital payment systems, leading to a stronger feeling of being part of shared goals (Sabli et al, 2025). As a result, meaning promotes engagement and emotional fulfillment, making QR-code M-payment a more enjoyable and rewarding experience in the post-pandemic context.

There are prior studies that provide similar findings, such as Chen and Li (2023), who conducted a study investigating gamification in WeChat's payment app and found that the insertion of playful and meaningful narratives increased user engagement and enjoyment, demonstrating how purpose-driven design elements enhance a satisfying payment experience. Another research study examined the effect of perceived enjoyment and usefulness on users' satisfaction and continued use of mobile payment services, emphasizing that incorporating intrinsic motivation through meaningful interaction helps sustain engagement (Wang et al., 2023).

The subsequent construct is development (H2b). As discussed previously, this core driver has no influence on attitude, which reflects a more stable, evaluative assessment centered on utilitarian factors such as convenience, security, and reliability. However, development is one of the intrinsic motivators that stimulates the emotional experience of QR-code M-payment through moments of satisfaction provided by gamified elements, which subsequently influences perceived enjoyment (Wong et al., 2021; Butt et al., 2024). This is because daily routine M-payment transactions can become more engaging when offered with rewards and progress cues, which explains why development enhances enjoyment without altering the deeper, habit-anchored attitude (Al-Zubi & Hamarsheh, 2021).

In 2021, a study proposed that gamification elements related to progress and mastery positively impact users' enjoyment and engagement in mobile financial services (Wang et al., 2021). Congruent with the findings of Chen and Kuo (2022), it was suggested that the feeling of achievement derived from gamified rewards stimulates intrinsic motivation, which in turn enhances perceived enjoyment in digital payments like e-wallet platforms.

Third significant relationship is the link between social influence and perceived enjoyment (H4b). Social influence is capable of changing payment activities to socially

engaging and emotionally rewarding experiences (Tu et al., 2022; Butt et al., 2024). The users feel a higher sense of participation and belonging when they see people surrounding them actively employing QR-code M-payment especially in gamified settings such as cashback or referral bonuses (Tu et al., 2022; Butt et al., 2024). These shared activities increase perceived enjoyment as it becomes more than just a functional performance, it becomes a socially agreeable behavior that is fun and rewarding.

Previous research supports this link. Prakash and Mohanty (2023) suggested that social influence, if integrated with gamification features, it helps users' perceived enjoyment and engagement with QR-code M-payment systems, as users derived satisfaction from competition, recognition, and peer endorsement. In addition, a research by Liébana-Cabanillas et al. (2021) proposed that in mobile payment adoption, social influence not only has impact on behavioral intention but also enhance enjoyment by creating a sense of social connection and shared experience among users. These findings demonstrate that QR-code M-payments, particularly in Malaysia's post-pandemic setting, gain a unique advantage from social influence, as it promotes both adoption and the emotional pleasure related with usage.

Nevertheless, there are three insignificant relationships between ownership, unpredictability and avoidance with perceived enjoyment. Apparently, the findings suggested that ownership does not influence perceived enjoyment in QR-code M-payment in the post-endemic COVID-19 period in Malaysia (H3b). Among the Octalysis gamification core drivers, ownership and possession usually boost intrinsic motivation when users can personalize what they own (Chou, 2014). However, QR M-payment applications in Malaysia, for instance, Touch 'n Go eWallet or DuitNow QR, provide standardized interfaces, fewer consumer-controlled features, and limited opportunities for customization, which limit the translation of ownership into hedonic value. Perceived enjoyment in M-payment contexts is more strongly affected by convenience, ease of use, and gamified incentives (Brito et al., 2018; Lehdonvirta et al., 2009).

Supporting this, Chong et al. (2024) and Chuah et al. (2024) indicated that QR M-payment adoption in Malaysia is usually influenced by functional benefits, social influence, and perceived value, rather than by emotional attachment or a feeling of control over the application. Not just that, since QR-code M-payment has become a habitual and predictable activity, the novelty and pleasure have been reduced, making ownership less important to enjoyment compared to other alternatives of payment

transactions. In contrast, cash provides a tangible sense of possession, and certain alternative digital payment systems incorporate more gamified and customizable features, which can create a stronger relationship between ownership and enjoyment.

The results also revealed that unpredictability does not significantly impact perceived enjoyment in QR-code–based M-payment (H5b). QR-code M-payments have become a strongly familiar and habitual transaction method, reducing opportunities for novelty or surprise that might promote perceived enjoyment. Perceived enjoyment derived from unpredictability is commonly related to contexts such as gaming or entertainment, where unexpected events generate excitement (Chou, 2014).

In this context, unpredictability as a gamification mechanism may not translate into positive curiosity because users evaluate mobile payment primarily based on functional and trust-related attributes. While certain providers employ gamified features, these remain unimportant to the main QR-code M-payment function and thus have limited capability to encourage perceived enjoyment for most users. Instead, prior studies indicate that perceived enjoyment in mobile payment systems is more strongly driven by convenience, ease of use, and transaction speed rather than novelty-based experiences (Liébana-Cabanillas et al., 2018; Oliveira et al., 2016). As such, in a mature and predictable payment ecosystem, curiosity-driven unpredictability is overshadowed by functional benefits in shaping enjoyment.

In terms of the non-significant relationship between avoidance and perceived enjoyment (H6b), Avoidance understood as a motivation to prevent negative outcomes such as security risks, lost rewards, or inconveniences has been shown in many studies to correlate with negative emotional states (e.g., anxiety, frustration) rather than positive affect (Elhai, Levine, Dvorak, & Hall, 2016). By contrast, perceived enjoyment reflects the extent to which the experience is fun, pleasurable, or intrinsically satisfying, and tends to be driven by different motivators (Amelia et al., 2022). Thus, when users continue using a technology like QR-code payment out of avoidance (to avert loss or risk), this behavior may sustain usage but does not necessarily lead to perceived enjoyment, because the affective experience is dominated by prevention, necessity, or fear rather than pleasure. The emotional state linked to avoidance is more negative and uncomfortable than the feeling of fun.

Therefore, avoidance does not translate into higher perceived enjoyment. A study by Rahi et al. (2023) found that hedonic motivation, which comprises perceived enjoyment, significantly influences consumers' behavioral intention to adopt QR-code

mobile payments. However, the study did not find a significant relationship between avoidance-related factors and perceived enjoyment, suggesting that avoidance does not directly contribute to this perceived enjoyment.

Taken together, the findings imply that users derive enjoyment from QR-code mobile payment only when gamification elements create meaningful experiences, a sense of progress, or social engagement. In contrast, ownership, unpredictability, and avoidance failed to enhance enjoyment because payment activities are generally brief, routine, and goal-oriented. Users typically seek transaction completion rather than entertainment, which limits the ability of certain gamification drivers to generate hedonic value. This further demonstrates that QR-code mobile payment differs from traditional gamified environments where curiosity, ownership, and uncertainty are often strong predictors of enjoyment.

5.2.1.3 Attitude towards M-payment, and M-payment Continuance Intention

The last discussion on direct effects relates to the link between attitude towards m-payment and m-payment continuance intention (H7), as well as the link between perceived enjoyment and m-payment continuance intention (H9). Both hypotheses were supported and meet researcher' prior expectation.

Post-endemic Malaysia has witnessed many QR-code m-payment consumers shaping favorable experiences with this application, which in turn form positive attitudes that can enhance users' continuance intention. This is because users have a tendency to keep using payment methods that consistently meet their needs and desires. Moreover, when users perceive QR-code m-payments as efficient and beneficial (e.g., faster transactions, ease of use), their attitudes more readily translate into continuance intentions. This finding consistent with TAM/UTAUT research in Malaysia showing that perceived usefulness/performance expectancy and ease of use shape attitudes which in turn influence intention and continuance of mobile payment usage (Abdul-Halim, 2021; Sehat et al., 2024).

Furthermore, value-adding features like gamified elements encourage affective attitudes towards QR-code payments, further raising the likelihood of continuance intention. Winata and Tjokrosaputro (2021) indicated that a positive attitude significantly influences continuance intention among mobile payment users, reinforcing the view that positive evaluations drive sustained adoption. In the setting of the COVID-

19 pandemic, Istijanto and Handoko (2022) also suggested that positive attitudes toward m-payment significantly increased users' continuance intention, emphasizing the enduring influence of attitude even during periods of behavioral change.

Moreover, users who hold more positive attitudes toward the gamification elements (i.e., find them enjoyable, useful or rewarding) are more likely to express intentions to use or continue using the mobile payment service. This relationship has been documented in gamification research (Hamari, Koivisto & Sarsa, 2017) and is supported in the Malaysian mobile-payments context, where attitudes toward payment apps significantly predict intention and continuance (Hafez et al., 2023).

5.2.1.4 Perceived Enjoyment and M-payment Continuance Intention

Besides, perceived enjoyment also has significant effect on m-payment continuance intention among Malaysian user. Perceived enjoyment is important to stimulate continued use of QR-code mobile payments, especially in a post-pandemic context where consumers have many alternatives such as contactless cards, other digital wallets, or cash. The pleasure derived from a smooth and fun payment experience differentiates QR-code payments and fosters positive attitudes that reinforce users' continuance intentions. QR-code m-payments nowadays have changed and become more integrated and enjoyable transactions in daily activities.

Even though the initial usage of QR m-payment was because of health and safety concerns, the continuance intention of QR-code payment now increasingly depends on how enjoyable and seamless the experience is for users. QR m-payment elements, for example, high-speed scanning, fast transaction feedback, intuitive app interfaces, and gamified elements like cashback rewards or streaks, enhance the perceived enjoyment of these systems, changing them from functional tools into preferred payment methods that attract users to keep using them.

Huang and Liao (2023) stated that the enjoyment from employing QR-code payment apps significantly encourages users' willingness to continue using the service beyond functional benefits. Similarly, Chong et al. (2020) emphasized perceived enjoyment as a key driver influencing consumers' adoption and ongoing use of QR-code mobile payments, noting that enjoyable and seamless payment experiences enhance positive user attitudes and behavioral intentions. Collectively, these results show how perceived enjoyment transforms user motivation from merely practical

reasons toward emotional and experiential factors, supporting long-term adoption and continuance usage of QR-code mobile payments.

5.2.2 Research Objective 2 and Research Question 2

Research objective	Research question
To determine the mediating effect of attitude and perceived enjoyment among Malaysians in predicting continuance intention of QR-code-based mobile payments after the emerge of COVID-19.	Are attitude and perceived enjoyment have mediating effect in predicting continuance intention of QR-code-based mobile payments after the emerge of COVID-19?

Research Question 2 was developed to identify the mediating effect of attitude towards m-payment and perceived enjoyment. Six hypotheses were designated for both mediators. Therefore, the following discussions will elaborate the results in two parts: 1) mediating effect of attitude towards m-payment on the relationship between octalysis gamification and m-payment continuance intention and 2) mediating effect of perceived enjoyment on the link between octalysis gamification and m-payment continuance intention.

5.2.2.1 Gamification, Attitude Towards M-payment, and M-payment Continuance Intention

Referring to the findings, attitude towards QR-code M-payment has a mediating impact on the link between sense of meaning and continuance intention in the post-endemic COVID-19 phase (H8a). During this time, users who are aware of the social and health benefits of contactless payments view QR-code M-payment not merely as a tool but as a medium to play a part in public health and economic recovery. This connection brings positive emotions, leading to favorable attitudes.

Grounded in these attitudes, users are more likely to sustain their usage, consistent with the Theory of Planned Behavior, which demonstrates that attitude directly influences behavioral intention (Ajzen, 1991). Without a positive attitude, the perceived meaningfulness of QR-code payments, such as supporting a cashless society or helping local merchants, may not translate into continued use. Therefore, attitude acts as a crucial mediator that transforms meaningful motivations into actual continuance intentions for QR-code M-payment in Malaysia's post-pandemic landscape (Chawla & Joshi, 2020; Foroughi et al., 2019).

Previous studies reported similar results, showing that users' perceived value which include social and altruistic benefits had a significant impact on their intention to

continue usage, with this effect being mediated by positive attitudes. The results emphasize that when users internalize the meaningful benefits of mobile payments, they develop positive attitudes that increase their likelihood of continued use (Huang & Yang, 2021). Meanwhile, Nguyen (2022) investigated QR-code payment adoption in Southeast Asia and found that users' recognition of the broader societal benefits of QR-code payments, including their role in fostering a cashless economy and providing safer transaction options during the pandemic, shaped positive attitudes that mediated continued usage intentions.

It appears that, attitude towards QR-code M-payment also has a mediating impact on the link between sense of social influence and continuance intention in the post-endemic of COVID-19 phase (H8d). QR-code M-payment is now a desirable and socially accepted system, not merely a functional payment platform. Through this, users' favorable attitudes can be built by social influence, especially in the post-endemic COVID-19 phase, as the application has obtained better recognition, largely because of gamified features and the influence of peers and family. In a collectivist culture like Malaysia, the ubiquity of QR M-payments helps people accept them as normal and encourages users to continue using them naturally (Foroughi et al., 2023).

However, social influence alone does not confirm continuance intention. For long-term usage, users must transform these social cues into their personal evaluations. When they see QR-code M-payment as convenient and rewarding, coupled with being socially endorsed, their attitudes become favorable, and this attitude encourages continuance intention. This process reflects the Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB), which posit that external influences, such as social norms, primarily affect behavior through changes in attitude (Ajzen, 1991).

This mediation pathway is supported by Istijanto and Handoko (2022), who highlighted that in M-payment continuance during the COVID-19 pandemic, social influence and attitude both predicted continuance intention, with attitude playing a pivotal role in translating social cues into sustained use. In addition, Widayat, Marsudi, and Masudin (2023) studied QR-code acceptance in Indonesia and suggested that social factors significantly influenced attitude, which in turn predicted intention to adopt QR payments; mediation analysis confirmed a significant indirect effect of social influence on adoption intention via attitude.

On the other hand, the findings indicated there was no indirect effect of attitude towards M-payment on the relationships between development, ownership,

unpredictability, and avoidance with M-payment continuance intention. The non-significant mediating effect of attitude towards M-payment in the link between development and M-payment continuance intention (H8b) can be illustrated by how the elements work in their own unique way through mental and emotional processes inside a user's mind.

Development and accomplishment in gamified systems are intrinsic motivators that primarily encourage users' emotional condition by offering moments of satisfaction and progress (Chou, 2014; Koivisto & Hamari, 2019). This shows development influences the intention to continue using QR-code M-payment through enhancing perceived enjoyment instead of altering attitude, which reflects a more consistent and stable judgment of the payment method. Moreover, since QR-code M-payments in this era have become common and accepted into daily routine, users' attitudes are largely shaped by reasons like convenience, security, and reliability (Chawla & Joshi, 2020; Istijanto & Handoko, 2022).

Consequently, additional gamified features such as earning vouchers, unlocking milestones, or collecting badges may not significantly influence users' attitudes but can still enhance usage continuity by making the experience more enjoyable and rewarding in the moment. This explains why development can affect M-payment continuance usage without a significant indirect effect through attitude. Several studies could back up these findings, including Wang et al. (2021), who indicated the relationship between gamification and continuance intention was mediated typically by perceived enjoyment rather than users' attitude. Moreover, Chen and Kuo (2022) highlighted that, intrinsic motivators like development significantly enhanced enjoyment, which then led to continued use of digital payment applications, and Wong et al. (2023) reported that in Malaysian mobile payment users, perceived enjoyment was a stronger predictor of continuance intention than attitude.

Furthermore, the non-significant mediating effect of attitude toward mobile payment in the relationship between ownership and QR-code–based M-payment continuance intention (H8c) demonstrates that users' possession of digital payment applications does not have a big impact on their evaluative judgments. It can be explained by several reasons. During the Movement Control Order (MCO), the use of QR-code mobile payment was almost compulsory in many shops and services. Because of this, most users started to own more than one application, such as Touch 'n Go eWallet, GrabPay, and ShopeePay. This ownership happened mainly because of

necessity, not because users had a strong liking or preference for any one app. As a result, many users see these apps as similar or interchangeable, which makes it harder for them to develop strong attitudes toward a single provider (Uncles, Dowling & Hammond, 2003; Zhou, 2013).

In the post-endemic period, QR-code payments continue to be used mainly because of habit and wide merchant acceptance, rather than because users consciously evaluate their attitudes. Previous studies also show that habit can sometimes replace attitude in predicting technology usage (Limayem, Hirt & Cheung, 2007; Venkatesh et al., 2012). In line with this, Suh and Han (2022) also found that habitual use of digital platforms can bypass attitudinal change, leading to continued use directly from prior adoption.

At the same time, Malaysian users are strongly motivated by cashback, discounts, and other rewards, as well as the integration of payment apps with services like transport, food delivery, or online shopping. These practical reasons often have a stronger influence than attitude itself (Hamari, 2017). In this context, people keep using QR-code M-payments mostly because it is convenient and part of their routine, not because their feelings about it have changed. This helps explain why ownership does not affect continuance intention through attitude.

Next is the mediating role of attitude towards M-payment on the link between unpredictability and M-payment continuance intention (H8e). The non-significant pathway is actually acceptable due to the nature of the digital payment system in the post-endemic COVID-19 era. In this adoption phase, QR-code M-payment is already well-known, and users' attitudes are less likely to be shaped by elements such as novelty or curiosity-driven experiences.

Furthermore, unpredictability related to gamified incentives, such as promotional surprises, does not fundamentally change users' attitudes toward the payment system, as financial services are inherently utilitarian and risk-sensitive (Sethu et al., 2022). In fact, unpredictability in payment transactions can be considered undesirable, even though it may provide enjoyment. Unpredictability offers short-term excitement rather than altering users' attitudes (Ruslim & Herwindiati, 2024).

Additionally, QR-based M-payment in Malaysia has become deeply embedded in daily routines; hence, continuance intention is driven mostly by habit and necessity rather than shifts in psychological evaluation. As a result, unpredictability exerts limited

influence on attitudes, and the hypothesized mediating pathway is not supported. This is consistent with several studies.

For example, Shetu et al. (2025) examined digital wallet users in Bangladesh and found that while functional and hedonic factors influenced attitudes, novelty-related or unpredictable technological elements did not lead to continuance intention through attitudinal pathways. Similarly, Putri et al. (2022) found in their research on e-wallet adoption in Indonesia that novelty-driven features (unpredictability) had no significant influence on user attitudes, which in turn did not drive continuance usage.

Last but not least is the non-significant mediating impact of attitude towards M-payment on the relationship between avoidance and continuance intention (H8f). Octalysis gamification's core driver, like avoidance, is derived from the feeling of fear of negative outcomes, such as missing out on rewards or facing security risks. While it may encourage continued use to prevent loss, it does not necessarily foster a favorable attitude or positive emotional response toward the technology. This is similar to findings such as Bulatao (2024), who showed that avoidance motivations have limited influence on user intention. In addition, research such as Djamhari et al. (2024) suggests that FOMO, while relevant in prompting initial usage or impulsive behaviors, does not always exert a strong or consistent effect on continuance intention in digital payment contexts. This further supports the view that avoidance (e.g., fear of missing out) does not significantly shape attitudes toward QR-code mobile payments.

Moreover, when behavior is habitual in this period, it is less affected by emotions such as avoidance, which reduces the influence of attitude in linking avoidance to the intention to continue using the service. A study by Hijazi and Abudaabes (2023) supported this finding by highlighting the complex interplay of psychological factors beyond mere avoidance, after they observed how digitalization anxiety moderates the link between protection motives and continuance intention. In addition, positive factors such as perceived ease of use, perceived usefulness, and the rewards offered have a greater impact on users' attitudes and their intention to keep using the service. Research shows that these factors are stronger at shaping users' attitudes and feelings about mobile payments, making the effect of avoidance motivations less important. In summary, avoidance can encourage users to keep using QR-code mobile payments by helping them avoid negative outcomes, but it does not strongly improve their opinions or feelings about the service. Thus, attitude does not

play an important role in connecting avoidance motivation to the intention to continue using it.

Overall, the mediation findings demonstrate that attitude only mediates the effects of gamification drivers that are capable of shaping users' evaluative judgments of QR-code mobile payment. Meaning and social influence successfully influence continuance intention through attitude because they contribute to users' positive evaluations of the payment system. In contrast, development, ownership, unpredictability, and avoidance appear insufficient to alter these evaluations. This finding suggests that attitude functions as a selective mechanism through which only certain gamification drivers influence continuance intention in utilitarian financial technologies.

5.2.2.2 Gamification, Perceived Enjoyment, and M-payment Continuance Intention

Regarding the mediated pathways between gamification core drivers, perceived enjoyment, and M-payment continuance intention, only three were reported as significant. First, perceived enjoyment was found to have a significant impact on the link between meaning and M-payment continuance intention (H10a). The sense of purpose that users have when they support a cashless society in the post-endemic phase builds favorable emotions.

However, if this users' feeling transforms into an enjoyable experience, the continuance intention to employ QR-code M-payment is stronger. In other words, epic meaning explains the reason behind using the service, while enjoyment provides the emotional satisfaction that keeps people coming back. The impact is more powerful as users choose to use this application for both hygiene and enjoyment purposes, compared to other alternatives. While other alternatives may be familiar, they are often less fun. Perceived enjoyment works as a psychological link, turning users' feeling of being part of something bigger (meaning) into a strong and lasting intention to keep using M-payment systems.

A study on the mediating effect of perceived enjoyment by Fang et al. (2021) suggested that the relationship between meaningful system qualities and user engagement is more positive with the existence of pleasure in users' experience. Supported by Amelia et al. (2024), the study found that both perceived enjoyment and perceived usefulness had a strong positive effect on users' intention to keep using

mobile payment services, showing that enjoyment is especially important for keeping users engaged. Collectively, this shows the positive mediating effect of perceived enjoyment. Hence, perceived enjoyment not only strengthens the sense that using mobile payment services is meaningful but also boosts user engagement, alongside perceived usefulness, in encouraging continued use.

Development in gamification offers users a feeling of accomplishment, but this element does not have a direct effect on continuance intention unless it creates a favorable emotional experience. This is where perceived enjoyment plays the role of the bridge between development and continuance intention, which explains why H10b was supported. When users gain rewards or see progress, the gamified features in QR-code M-payment make using the app more enjoyable, exciting, and emotionally rewarding. This feeling of fun stimulates intrinsic motivation, which has been discussed in TAM and gamification literature as a reason for repeated system usage (Davis et al., 1992; Venkatesh et al., 2003; Hamari et al., 2014). Without perceived enjoyment, development/accomplishment might be seen as routine or insignificant, but when enjoyment is present, it encourages the likelihood of repeating the behavior (Deci & Ryan, 2000; Hsu & Lu, 2004).

This point becomes more relevant in the post-endemic COVID-19 context in Malaysia (Chaw, Tang & Ali, 2024). Since QR-code M-payments are already common, continuance usage now relies more on whether the experience is still enjoyable (Gan & Li, 2022). Small rewards, such as instant cashback, coins, or badges, add emotional value beyond practical benefits (Hamari, 2017; Kumar, Prashar & Shah, 2023). Therefore, enjoyment plays a key role in turning gamified achievements into ongoing usage (Hafez et al., 2023; Koivisto & Hamari, 2019).

This is supported by Nguyen et al. (2024), who investigated Vietnam's MoMo e-wallet and found that gamification features like competition, rewards, and progress significantly boost perceived enjoyment, which then increases users' intention to continue using the service. Similarly, Fazal-e-Hasan et al. (2022) indicated that gamification in mobile money services enhances customer engagement and continued use through hedonic value (enjoyment), supporting the connection between achievement-oriented features and continuance.

Apparently, perceived enjoyment was found to have a significant mediating effect on the link between social influence and M-payment continuance intention (H10d). This may occur because perceived enjoyment has the ability to transform social

cues into intrinsic motivation (Davis et al., 1992; Deci & Ryan, 2000). When individuals observe their families, peers, or public figures actively using QR-code M-payments, particularly in a gamified setting, the usage experience becomes more enjoyable, rewarding, and engaging (Hamari & Koivisto, 2015; Hsu & Lu, 2004).

This represents more than social approval; users anticipate similar enjoyment when they use the application, which strengthens their affective responses toward it (Shen, Wang & Sun, 2019; Gan & Li, 2022). This demonstrates that favorable emotional responses are important, as continuance intention does not occur solely because of others' influence users may also repeat usage due to intrinsically enjoyable experiences, which foster engagement (Hamari, 2017; Kumar, Prashar & Shah, 2023). In this sense, perceived enjoyment acts as a psychological bridge between social influence and continuance intention (Koivisto & Hamari, 2019; Hafez et al., 2023).

Previous research supports this relationship. Franque et al. (2021) found that social influence strongly affected continuance intention for QR payments, highlighting the role of enjoyment derived from socially endorsed interactions, while Akdim et al. (2022) emphasized that perceived enjoyment, influenced by social and gamified experiences, directly boosted users' intention to continue using the service.

Referring to the findings, perceived enjoyment has no significant mediating effect on the relationships between ownership, unpredictability and avoidance with M-payment continuance intention. To use QR-code M-payment, users need to scan a universal code with limited space for personalization; this is because this payment system is highly standardized and utility-driven. In contrast, according to Chou (2014), ownership in gamification often promotes enjoyment when users perceive personalization and exclusivity. If there is no uniqueness or visible possession, ownership is incapable of generating feelings of pleasure during QR-code M-payment usage (Kim et al., 2023).

The post-endemic COVID-19 boosted the acceptance of QR-code payment mostly for its criteria such as being hygienic or safe rather than for psychological attachment (Tian et al., 2024; Chaw, Tang & Ali, 2024). Commonly, enjoyment comes from extrinsic gamified rewards, while ownership features do not involve fun or playfulness in the application (Hamari, Malik & Langley, 2022; Suh & Han, 2022). Hence, ownership is unable to stimulate the intrinsic motivation needed for enjoyment. This circumstance elucidates why ownership does not have significant influence on M-payment continuance intention through perceived enjoyment (H10c). Perceived

enjoyment generally boosts continuance intention, which is frequently related to factors that are associated with functional value or tangible benefits. For example, Emi et al. (2024) reported a favorable link between usefulness, enjoyment, and continued use of M-payment. This effect is detached from ownership.

The non-significant mediated pathway between unpredictability–perceived enjoyment–M-payment continuance intention (H10e) may occur because unpredictability in QR-code M-payment, such as surprise cashback or hidden rewards, is commonly created to stimulate short-term excitement (Hamari, Malik & Langley, 2022; Xi & Hamari, 2021). In the mobile payment setting, unpredictability may be interpreted as risk, hence increasing its incapability to build long-term enjoyment (Kim et al., 2023; Tian et al., 2024). Users' opinions of random surprises in a serious and high-trust transaction like QR-code M-payment are typically not treated as fun and enjoyable (Suh & Han, 2022; Gan & Li, 2022). Since this system in the current phase has become predictable, curiosity-driven features have reduced and failed to trigger enjoyment adequately to affect continuance intention to use (Hafez et al., 2023; Chaw, Tang & Ali, 2024).

Thus, the mediating effect of perceived enjoyment loses its relevance between unpredictability and M-payment continuance intention (Kumar, Prashar & Shah, 2023). Collectively, unpredictability is manifested through gamified features but only sparks momentary excitement, which is not enough to affect users' feelings of enjoyment (Hamari & Koivisto, 2019). As stated by Suo et al. (2022), hedonic motivation (enjoyment) lacked significant predictive power, while Putri et al. (2022) found that genuine continuance motivation comes mainly from utilitarian and social gratifications. Thus, in a mature and predictable digital payment context, enjoyment tied to novelty fails to mediate continuance intention effectively.

H10f is not supported, therefore, there is no significant mediating impact of perceived enjoyment on the relationship between avoidance and M-payment continuance intention. Avoidance is basically motivated from a feeling fear of loss, which does not involve positive emotion and total opposite to perceived enjoyment. If users employ QR-code M-payments to prevent negative outcomes, for instance, fear of missing cashback or preventing inconvenience compared to cash, their action is mainly because of necessity and pressure, not due to feeling of fun. As such, avoidance may keep people using the service but does not create enjoyment, making the mediating path weak or non-significant.

This finding can be supported by previous studies that suggested avoidance usually fail to generate hedonic responses. Zhang et al. (2023) proposed that fear of missing out (FOMO) in digital usage fosters obligation-driven rather than enjoyment-driven engagement, while Ye et al. (2023) emphasized that avoidance motivations in mobile payment adoption increase continuance intention through necessity but are detached from hedonic value. In addition, George (2022) highlighted that intrinsic enjoyment is mainly triggered by positive drivers such as playfulness or curiosity, not by negative factors like avoidance.

Collectively, the findings indicate that perceived enjoyment is a more relevant mediating mechanism for intrinsic and socially driven gamification experiences than for ownership-, uncertainty-, or avoidance-based motivations. This highlights the importance of affective experiences in sustaining QR-code mobile payment usage and suggests that enjoyment may explain continuance intention more effectively than attitude for several gamification drivers in post-pandemic financial technology contexts.

5.2.3 Research Objective 3 and Research Question 3

Research objective	Research question
To discover the moderating effect of mindfulness in predicting continuance intention of QR-code-based mobile payments in Malaysia during the post-endemic phase of COVID-19	Is mindfulness has moderating effect in predicting continuance intention of QR-code-based mobile payments in Malaysia during the post-endemic phase of COVID-19?

Research Question 3 was formulated to examine the moderating role of mindfulness. A total of twelve hypotheses were proposed for this moderator. Accordingly, the discussion is organized into two parts: (1) the moderating effect of mindfulness on the relationship between octalysis gamification and attitude toward mobile payment, and (2) the moderating effect of mindfulness on the relationship between octalysis gamification and perceived enjoyment.

5.2.3.1 The Interaction Effect of Mindfulness on the link between Gamification Core Drivers and Attitude Towards M-payment

According to the results, only two out of six hypothesized relationships were significant, namely H11c and H11d. The first unsupported hypothesis (H11a) proposed that mindfulness would strengthen the relationship between meaning and attitude, but this was not confirmed. A plausible explanation is that the direct effect of meaning on attitude is already strong, leaving little scope for mindfulness to further enhance it.

When users perceive QR-code mobile payment as meaningful, intrinsic motivation and emotional connection alone are sufficient to shape positive attitudes, regardless of their mindfulness levels.

Mindfulness emphasizes conscious reflection, awareness of alternatives, and contextual engagement. While these qualities typically enhance decision-making, the symbolic meaning and societal narratives of QR-code payments during the post-COVID-19 period were already widespread and normalized. Even less mindful users could relate to the broader purposes of QR adoption, such as safety or innovation, without additional reflection. This suggests that meaning exerts a universally strong influence on attitudes, rendering mindfulness a less effective moderator.

Prior findings also indicate that when motivational drivers are deeply value-based or emotionally anchored, the incremental role of mindfulness diminishes (Zhou et al., 2021). In Malaysia's post-pandemic context, the symbolic meaning attached to QR-code payments appears to outweigh users' mindfulness in shaping attitudes.

Similarly, H11b was not supported. This hypothesis examined the moderating effect of mindfulness on the relationship between development and attitude. In the post-endemic environment, QR-code payments have become standardized within the digital payment system, offering limited opportunities for mastery or personal growth. Thus, the sense of accomplishment from using QR payments is minimal, regardless of mindfulness levels. Mindful users may pay closer attention to their experiences, but the uniform and simplified nature of QR transactions leaves little developmental value to influence attitudes. In such a case, mindfulness cannot amplify a weak relationship.

Evidence from mobile technology studies supports this interpretation: Tu et al. (2022) found that adoption was mainly driven by utilitarian and health-related benefits, while mastery and progress offered little explanatory power. Likewise, Islam et al. (2024) confirmed that attitudes in mobile payment contexts were strongly shaped by effort expectancy, social influence, and perceived value, whereas growth-related drivers were negligible. Collectively, these findings highlight that attitude towards QR payments remain functionally anchored, and mindfulness does not significantly strengthen this weak developmental pathway.

The moderating effect of mindfulness was also not supported for the relationship between unpredictability and attitude (H11e). Unpredictability in gamification, while effective in other contexts, introduces uncertainty in financial transactions. In payment settings, uncertainty often conflicts with users' expectations of trust, stability, and

reliability. For mindful individuals, heightened awareness may actually intensify sensitivity to risk rather than reframe unpredictability as novelty. Consequently, unpredictability fails to foster positive attitudes even among mindful users. This interpretation aligns with Sun et al. (2016), who argue that mindfulness sharpens rational evaluation, prompting users to prioritize trust and transparency over playful uncertainty.

In Malaysia's post-pandemic setting, where QR payments are routine and efficiency is valued, curiosity-inducing features appear irrelevant or counterproductive. Supporting evidence shows that mindfulness does not necessarily amplify the effect of unpredictability in fintech contexts. Taşkan et al. (2025) found that mindfulness weakened the relationship between uncertainty and adaptive performance, while Humayrah (2023) reported no significant moderation effect of mindfulness on novelty-driven motivations in mobile payment adoption. These findings suggest that mindfulness reinforces stability-seeking behaviors, reducing the influence of unpredictability on attitudes.

H11f, which examined the moderating role of mindfulness on the relationship between avoidance and attitude, was also not supported. Avoidance is a fear-based, loss-prevention motivator, whereas mindfulness emphasizes openness and conscious evaluation (Sun et al., 2016). Thus, mindfulness may reduce the intensity of avoidance-driven responses rather than convert them into favorable attitudes.

Prior research supports this interpretation: Wang et al. (2020) showed that avoidance does not produce positive attitudinal outcomes even with high cognitive awareness, and Kim and Hall (2021) found that mindfulness is more effective in moderating positively framed motivations than negatively framed ones. In Malaysia's post-COVID-19 context, where QR payment usage is already habitual, avoidance plays a diminished role, explaining why mindfulness does not strengthen its influence on attitude.

Having discussed the unsupported hypotheses, this section addresses H11c that is found to be supported, thus, mindfulness strengthens the link between ownership and attitude toward QR-based mobile payment. This happens because mindfulness, reflects how individuals consciously process their experiences. When people are highly mindful, they do not treat ownership as a static state, but as an active, meaningful engagement with the technology (Bahl et al., 2016; Brown & Ryan, 2020). They notice

the convenience, contextual benefits, and new possibilities associated with using the QR payment system (Kumar, Prashar & Shah, 2023; Tian et al., 2024).

This awareness transforms mere ownership into a positive evaluative attitude because they consciously connect their sense of possession with the benefits of usage (Brown, Creswell & Ryan, 2021; Hafez et al., 2023). In contrast, those with low mindfulness might perceive ownership more superficially, by which, owning an app or having access does not necessarily shape their emotions or evaluations (Garland et al., 2021; Chaw, Tang & Ali, 2024). They may overlook subtle advantages, remain disengaged, or treat the system as just another tool, hence showing a weaker ownership and attitude relationship (Suh & Han, 2022; Kim et al., 2023).

This aligns with findings in consumer psychology where mindful individuals tend to evaluate possessions more positively when they are contextually aware and engaged (Brown & Ryan, 2003; Tran, 2021). In digital adoption research, similar patterns suggest that mindful users are more intentional and reflective in linking ownership experiences with attitudes toward technology use, making the moderation effect significant. Recent studies provide support for the moderating role of mindfulness in strengthening the effect of ownership on attitude.

For example, Sun et al. (2016) conceptualized mindfulness as a multidimensional construct in technology use and showed that mindful users process experiences more deliberately, making them more sensitive to contextual benefits of ownership. More recently, Guo et al. (2020) found that users with higher mindfulness demonstrated stronger positive evaluations of mobile applications, as mindfulness enhanced their awareness of benefits and reduced impulsive or habitual reliance on technology.

Similarly, Liao et al. (2022) highlighted that mindful individual tend to reflect more deeply on their technology use, which strengthens the relationship between personal engagement (such as ownership or control) and their attitudes toward the technology. In the post-endemic COVID-19 context of Malaysia, this explains why ownership of QR-code m-payment is more strongly associated with positive attitudes among mindful users. This is because they consciously interpret their ownership as part of a broader narrative of safety, innovation, and societal contribution.

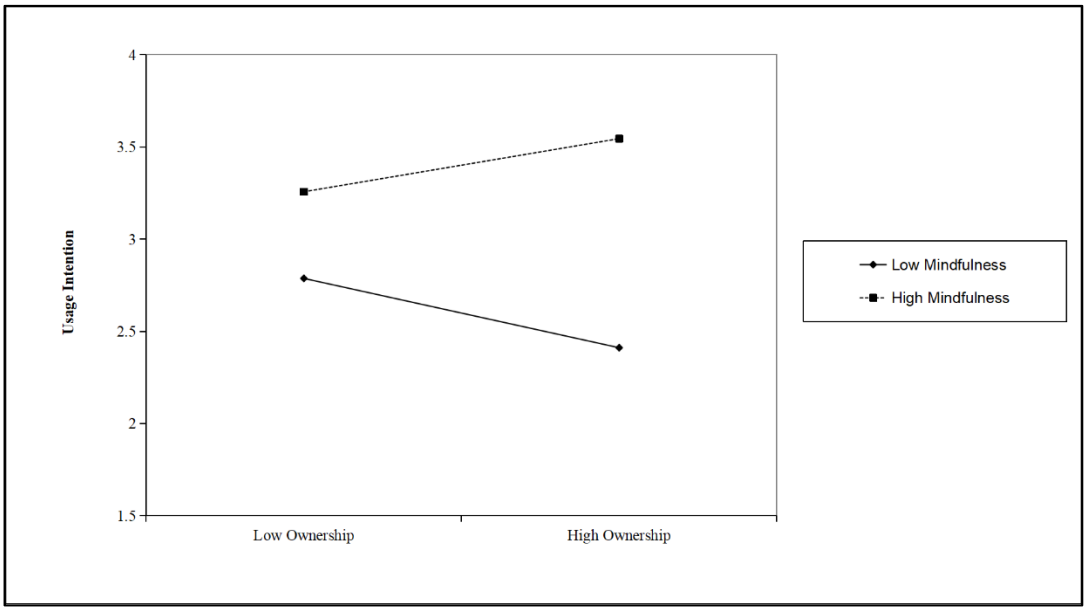

Figure 5.1 Moderating Effect of Mindfulness on the relationship between Ownership and Attitude Towards M-payment

Lastly, the relationship between social influence, mindfulness, and attitude towards M-payment is found to be significant but surprisingly H11d is not supported. The significant coefficient ($\beta = -0.105$, $p < 0.05$) indicates that mindfulness does indeed moderate the relationship between social influence and attitude, but in the opposite direction than expected. Specifically, the interaction plot showed that as mindfulness increases, the effect of social influence on attitude becomes weaker. The significant negative interaction provides an important theoretical insight into the role of mindfulness in QR-code mobile payment usage. Rather than amplifying the influence of social cues, mindfulness appears to reduce users' dependence on external opinions when forming attitudes. This suggests that mindful users rely more heavily on their own evaluations and experiences than on peer endorsement or social approval. This outcome is theoretically plausible, as individuals with high mindfulness tend to rely more on their internal reflections and less on external pressures when forming evaluations.

The negative moderating effect of mindfulness on the relationship between social influence and attitude suggests that mindfulness does not universally strengthen the effects of gamification drivers. Instead, mindfulness appears to function as a boundary condition that changes how users process external influences. Individuals with higher levels of mindfulness tend to be more aware of their own thoughts, experiences, and decision-making processes. Consequently, they are less likely to be swayed by peers, family members, or influencers in shaping their attitudes toward QR-code M-payment, because mindfulness helps individuals regulate attention and reduce

automatic conformity to external pressures (Brown et al., 2019; Hanley et al., 2020). Mindful individuals are more attuned to their internal values and needs, which makes them rely less on others' approval or normative influence when evaluating mobile payment usage (Li & Teng, 2021). In contrast, individuals with lower mindfulness appear more susceptible to external cues, as they often rely on social heuristics and cues from their environment, which strengthens the influence of social norms on their attitudes (Pratscher et al., 2019; Chen et al., 2022). Hence, while the moderation is statistically significant, its direction highlights mindfulness as a buffering mechanism that reduces, rather than enhances, the effect of social influence.

One possible explanation for the negative moderation effect is that individuals with higher mindfulness are less dependent on external cues such as social influence when forming attitudes toward mobile payment. Mindfulness reflects qualities such as cognitive flexibility (Sun et al., 2016). These traits encourage individuals to rely more on their own evaluations and internal experiences rather than conforming to peer, family, or influencer endorsements. As a result, even if social influence is present, highly mindful users may not internalize it as strongly in shaping their attitudes, leading to a weaker social influence and attitude relationship. In contrast, individuals with lower mindfulness are less reflective and more likely to follow group norms or external approval (Sun et al., 2016). For them, social influence serves as a critical shortcut in forming favorable attitudes toward mobile payment. This explains why the interaction plot shows that as mindfulness increases, the effect of social influence on attitude decreases.

In other words, mindfulness strengthens autonomous decision-making, thereby reducing the weight of social influence in attitude formation. The finding is not uncommon as in previous research in psychology and IS has shown that high mindfulness can buffer or even dampen the impact of social or environmental pressures on individual attitudes and behaviors (Brown et al., 2007; Good et al., 2016). Thus, although H11d predicted a more positive effect under high mindfulness, the opposite result suggests that mindfulness in this context functions as a substitutive factor, reducing reliance on social influence because mindful individuals develop attitudes more independently.

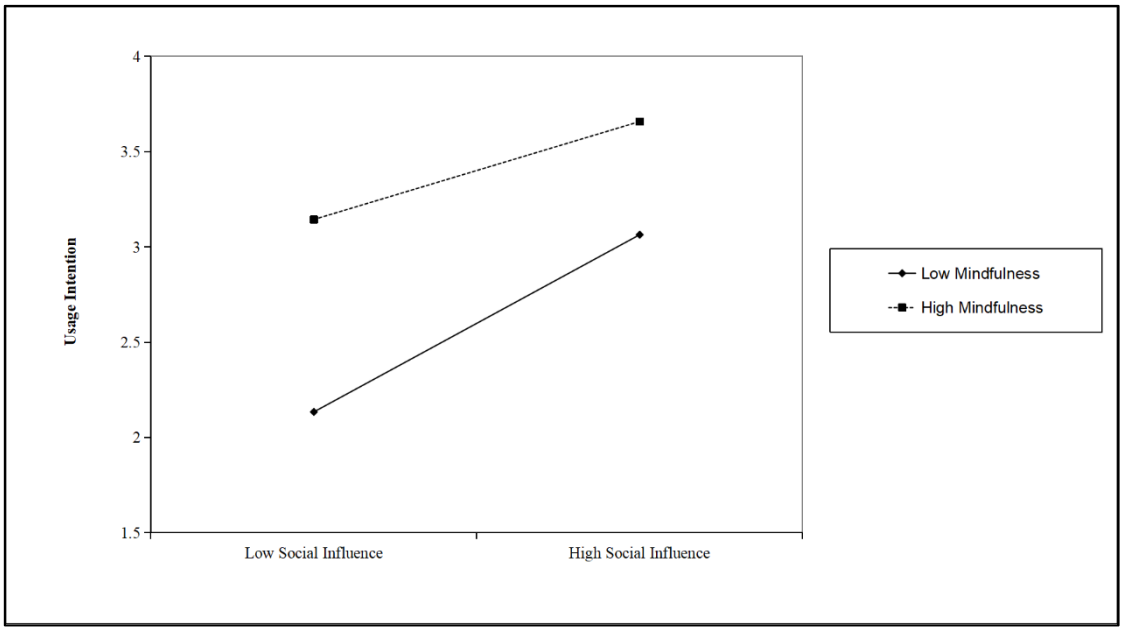

Figure 5.2 Moderating Effect of Mindfulness on the relationship between Social Influence and Attitude Towards M-payment

5.2.3.2 The Interaction Effect of Mindfulness on the link between Gamification Core Drivers and Perceived Enjoyment

Apparently, all hypotheses in this section are not supported. First, the moderating effect of mindfulness on the link between meaning and perceived enjoyment, H12a. This proposes that the enjoyment derived from meaningful engagement with QR-code m-payment may not depend on a user's level of mindfulness. When users perceive their actions as contributing to a greater purpose, the sense of fulfilment itself is inherently enjoyable. Thus, the intrinsic pleasure linked to meaning appears to influence users across varying levels of mindfulness, reducing the significance of mindfulness as a boundary condition.

Another possible explanation is that perceived enjoyment in QR-code mobile payments tends to be shaped by hedonic features such as gamified rewards, cashback promotions, and referral bonuses. Research indicates that these elements significantly enhance user satisfaction and engagement. For instance, a study by Kumar (2025) identifies rewards as extrinsic motivators that, alongside intrinsic factors like perceived enjoyment, influence users' intention to continue using digital payment. These elements generate immediate fun and satisfaction regardless of how reflective or mindful the user is. In this sense, the effect of meaning on enjoyment may already be complemented or

even overshadowed by extrinsic incentives, leaving mindfulness with little additional moderating role.

Moreover, since QR payments became normalized during the pandemic as a safe and convenient tool, users may associate enjoyment with ease and habit rather than reflective awareness, further explaining the lack of moderation. This finding resonates with prior research which noted that mindfulness does not always strengthen relationships where the base construct already carries strong intrinsic motivation or hedonic value (Zhou et al., 2021; Chen & Li, 2023). In other words, the meaningfulness of contributing to a social good and the hedonic design of QR-code m-payment systems are sufficient to foster enjoyment without requiring a heightened state of mindfulness.

Second, H12b was not supported. This finding suggests that even when users are highly mindful, the sense of development and accomplishment in QR-code m-payment does not translate into greater enjoyment. In gamification theory, development is expected to drive enjoyment by fostering progress and achievement (Chou, 2014). However, the nature of QR transactions in Malaysia's post-endemic context offers limited opportunities for such experiences. The system is designed to be simple, fast, and uniform through QR-code transactions, which minimizes complexity and challenge.

As a result, enjoyment derived from development remains unchanged regardless of a user's mindfulness level. While qualities in mindfulness can enhance sensitivity to experiences, they do not amplify enjoyment when the underlying task lacks depth or novelty (Li et al., 2023). In practice, QR payments have become habitual and functional rather than gamified or skill-based, leaving mindful users to perceive them as routine financial transactions. Consequently, enjoyment arises more from extrinsic rewards such as vouchers, discounts, or cashback than from intrinsic feelings of mastery, and mindfulness does not significantly change this dynamic.

Prior studies support the pathway linking development, perceived enjoyment, and continuance intention, but they also clarify why mindfulness did not significantly moderate this relationship in the present study. Hoang and Trung (2022) found that gamification features such as social interaction, competition, and rewards enhanced perceived enjoyment, which subsequently strengthened continuous usage of the Momo e-wallet. Similarly, Nguyễn (2024) showed that gamified elements in Vietnamese e-wallets increased enjoyment, which acted as a crucial driver of continuance intention.

However, Malaysia's post-endemic context presents a different reality; QR payments have been normalized as part of daily life since the pandemic, leaving little novelty or challenge for mindful users to reflect upon (Hajazi, Chan, Ya'kob, Siali, & Abdul Latip, 2021). Instead, enjoyment is largely shaped by extrinsic rewards such as cashback, vouchers, and discounts, rather than by intrinsic experiences of mastery (Sin, 2025). In this environment, mindfulness does not significantly strengthen the development and enjoyment relationship because heightened awareness or novelty seeking cannot amplify enjoyment that is already grounded in routine and extrinsic incentives (Li et al., 2023). Thus, while development contributes to perceived enjoyment in theory, the post-COVID normalization of QR payments limits the moderating role of mindfulness.

In addition, the results indicate that mindfulness does not strengthen the relationship between ownership and perceived enjoyment in the context of QR-code–based mobile payments (H12c). It suggests that even highly mindful individuals do not necessarily derive greater enjoyment from simply "owning" or using an m-payment app. One possible explanation lies in the nature of QR payments themselves. Unlike gaming, fashion, or personalized digital services where a sense of possession can enhance emotional satisfaction, QR payment systems are designed to be standardized, functional, and utility-driven. Users engage with them primarily for efficiency, transaction speed, and financial incentives such as cashback, rather than for hedonic or experiential purposes (Abdullah, Yahya, & Omar, 2023).

Furthermore, although mindfulness helps individuals focus more attentively on their experiences, this awareness does not translate into higher enjoyment in QR payment usage. The transactional process remains uniform and provider-controlled, leaving little room for customization or personal expression that could generate hedonic value. Thus, even mindful users perceive QR payment as a convenient but routine financial tool, not as a source of intrinsic enjoyment. This outcome aligns with recent findings in digital payment studies where perceived enjoyment is often linked to gamified rewards or interactive features rather than to a sense of ownership.

For example, Emi Amelia et al. (2024) found enjoyment in m-payment to be primarily driven by usefulness and rewards, while a study on OVO in Indonesia (Alfany et al., 2019) reported no significant effect of enjoyment on attitudes when personalization was absent. These insights imply that in QR-based payments, the drivers of enjoyment are extrinsic and gamification-related, not intrinsic feelings of possession,

thereby explaining why mindfulness could not moderate the ownership with perceived enjoyment relationship.

Besides, the results indicate that H12d, which proposed a positive moderating role of mindfulness on the relationship between social influence and perceived enjoyment, is not supported. Although social influence was found to significantly shape perceived enjoyment, mindfulness did not enhance this relationship. This may happen because of the nature of perceived enjoyment as an intrinsically driven experience. Enjoyment in using QR-based m-payment often stems from gamified features which provide direct gratification regardless of social endorsement (De Canio, Faggioli, Lamberti, & Noci, 2021). For highly mindful individuals, enjoyment is more strongly tied to personal engagement and internal satisfaction than to external cues.

As a result, mindfulness may diminish rather than strengthen reliance on social influence when evaluating enjoyment (Li et al., 2023). In other words, mindful users are less likely to derive fun simply because others around them are using the system; instead, their enjoyment comes from their own direct interaction with the application. This may explain why the hypothesized positive moderation was not supported.

In collectivist settings like Malaysia, social influence often boosts enjoyment through shared experiences, peer competition, or visible rewards (Yuan, Zhang, & Wang, 2024). However, when mindfulness is high, people are more attuned to their internal states and less swayed by others' behavior. In effect, the presence of social influence may contribute less to boosting enjoyment among mindful individuals, because they derive enjoyment more from their own engagement with the technology rather than from observing peers or influencers (Li et al., 2023). Cultural values might amplify this effect; while collectivist norms typically favor external validation, mindful users might partially detach from these norms and rely more on personal criteria, lowering the marginal effect of social influence on enjoyment.

Two recent studies lend support to this perspective. First, a study by Purbondaru et al. (2022) found that mindfulness strongly predicted intention to use e-wallets, but its interaction effects with social or normative influences were weak or insignificant for affective variables; the enjoyment component was more tied to perceived usability and novelty than to peer or social endorsements. Second, research on excessive social media use revealed that mindfulness negatively moderates the relationship between social media use (which includes social cues) and emotional outcomes like learning burnout; mindful individuals are less reactive to external/social stimuli when it comes to

emotional or hedonic outcomes, which is analogous to perceived enjoyment (Ma et al., 2025). Together, these suggest mindfulness may reduce the extent to which social influence translates into enjoyment.

Next, the results show that mindfulness does not significantly moderate the relationship between unpredictability and perceived enjoyment in QR-code mobile payment usage, H12e. Apparently, unpredictability in financial contexts does not translate into genuine enjoyment, even among highly mindful users. Unlike entertainment or gaming applications where unpredictability can spark curiosity and positive affect, mobile payment is a high-trust, utilitarian activity in which users expect stability, speed, and security (Zhou, 2011). For mindful users, who are characterized by heightened awareness and attentiveness, unpredictability is more likely to be interpreted as uncertainty or risk rather than a source of fun (Humayrah, 2023).

This reduces the capacity of curiosity-driven features such as “scan and win” or surprise cashback to meaningfully enhance enjoyment. Moreover, in the post-endemic Malaysian context, QR payments have become normalized and routine, meaning the novelty aspect of unpredictability no longer excites users. Instead, enjoyment in mobile payment primarily stems from functional benefits rather than surprise or curiosity (Wong, 2023). Thus, even when mindfulness levels are high, the moderating pathway fails because unpredictability does not significantly contribute to perceived enjoyment in this utilitarian setting.

Supporting evidence from recent studies helps explain why H12e was not supported. Wang et al. (2024), using EEG measures, examined emotional responses in mobile payment and found that while such payments can evoke pleasure and reduce the pain of paying compared to cash, the mediation paths through single emotional mechanisms like pleasure alone were not significant, suggesting that enjoyment in payment contexts is not strongly driven by unpredictability or novelty but rather by predictable and fluent transactions.

Similarly, Suo et al. (2022) investigated mobile wallet app characteristics and showed that interactivity and visual appeal significantly influenced perceived enjoyment, which in turn affected impulse buying; however, unpredictability or novelty-type aspects did not provide additional impact on enjoyment beyond design and usability features. These studies indicate that in financial technology contexts, enjoyment is anchored more in reliability, interface quality, and seamless use than in

curiosity or surprise, supporting the nonsignificant moderating role of mindfulness in the link between unpredictability and perceived enjoyment.

Last but not least, H12f was also rejected. This result might occur due to the mismatch between the nature of avoidance and the emotional foundation of enjoyment. Avoidance is primarily a loss-prevention mechanism, where users continue using mobile payment to avoid inconveniences, missing promotions, or security concerns. Such fear-based motivations do not naturally stimulate enjoyment, which is an intrinsic, pleasure-driven state arising when users find the activity engaging or fun (Davis et al., 1992). Even for highly mindful users, awareness and attentiveness do not convert avoidance into enjoyment, since the underlying psychological state is grounded in pressure and necessity rather than positive affect.

This finding resonates with prior studies that demonstrate the limited role of avoidance in generating hedonic value. Wang et al. (2020) reported that avoidance-driven motivations in technology use foster compliance but fail to create enjoyment. Likewise, Xu et al. (2022) highlighted that perceived enjoyment is largely associated with positive drivers such as playfulness, rewards, and novelty, but not with negative, fear-based motivations. In the post-endemic phase of QR-code mobile payment, where the service has become routine, enjoyment is more strongly shaped by features like ease of use, interactivity, and rewards, not by avoidance of loss. Consequently, mindfulness does not strengthen the link between avoidance and enjoyment, as the motivational pathway itself does not align with the positive emotions required to foster hedonic responses.

The differential moderating effect of mindfulness suggests that mindfulness may operate more strongly through cognitive mechanisms rather than affective mechanisms. As a psychological state involving awareness and deliberate attention, mindfulness may encourage users to consciously evaluate the benefits and value of mobile payment features, thereby strengthening the relationship between gamification-related stimuli and attitude. However, enjoyment represents an immediate affective response that may depend more on experiential and emotional factors, which may explain why mindfulness did not significantly strengthen this relationship. This study extends mindfulness application in fintech by showing that its moderating role is pathway-dependent rather than universally applicable.

5.3 Research Contributions

This study offers two main research contributions: theoretical and practical. The theoretical contribution explains how the findings extend existing theories, while the practical contribution provides insights for marketers and society on applying gamification elements in non-gaming contexts such as mobile payments. In particular, the study highlights which theoretical perspectives can be used to foster consumers' continuance intention toward QR-code mobile payment in Malaysia. Additionally, the role of mindfulness is incorporated into the discussion, offering a deeper understanding of its influence in this domain.

5.3.1 Theoretical Contributions

This research integrates perspectives from gamification and mindfulness into a unified framework to explain continuance intention of QR-code-based mobile payments in Malaysia. Drawing on the Octalysis framework (Chou, 2014) and the Mindfulness in Technology Adoption (MTA) perspective (Sun et al., 2016), this study extends existing QR-code mobile payment continuance research by integrating selected gamification drivers, affective mediators, and mindfulness to explain post-adoption behaviour. By doing so, it provides a more nuanced understanding of how selected gamification drivers and mindfulness interact in explaining continuance intention beyond initial adoption, particularly in the financial technology domain.

Although mobile payment research has expanded significantly over the past decade, most prior studies have focused on early adoption and functional benefits such as convenience, security, and ease of use (Khalilzadeh et al., 2017; Dahlberg et al., 2015). These paradigms, while useful, have largely overlooked the post-adoption stage, which is crucial for sustaining mobile payment ecosystems in the post-endemic era. By addressing this gap, the present study demonstrates that continuance intention is influenced not only by utilitarian factors but also by hedonic and motivational elements such as perceived enjoyment and gamified experiences, thereby extending the scope of mobile payment research toward the acceptance in the post-endemic of Covid-19.

This study further contributes to the gamification literature by empirically examining selected Octalysis drivers within the mobile payment domain, an area where it remains underexplored. While gamification has been widely studied in education, health, and e-commerce (Huotari & Hamari, 2017; Hamari & Koivisto, 2015;

Eisingerich et al., 2019), few studies have investigated its role in financial technology. By examining multiple core drivers: meaning, development, ownership, social influence, unpredictability, and avoidance, this study identifies their differential impacts on user attitudes and perceived enjoyment.

The findings refine gamification theory by demonstrating that certain drivers like meaning emerged as a strong predictor of positive attitudes, confirming that users' desire to be part of something bigger than themselves enhance their engagement with the application. Conversely, avoidance shows weaker or inconsistent effects, suggesting that negative motivators are less transferable to fintech. This suggests that gamification elements are context-dependent and not equally effective across domains, encouraging future scholars to carefully match gamification drivers to specific domains.

Another significant theoretical contribution lies in the examination of attitude and perceived enjoyment as mediators between gamification core drivers and continuance intention. While previous research has acknowledged these constructs, few studies have modeled them together in a dual mediation framework for mobile payment. The findings reveal that the two mediators play distinct roles. Specifically, attitude significantly channels the effects of meaning and social influence into continuance intention, which aligns with studies showing that attitudes remain a central driver of mobile payment adoption and continuance in Malaysia (Teo et al., 2022). Meanwhile, perceived enjoyment mediates the influence of meaning, development, and social influence, consistent with research that highlights enjoyment as a key affective factor in sustaining gamified digital services (Hamari et al., 2020).

In contrast, ownership, unpredictability, and avoidance did not show significant indirect effects through either attitude or enjoyment, suggesting that not all gamification drivers translate into psychological mechanisms that sustain behavior. Overall, this dual mediation model enriches technology and gamification research by clarifying how certain motivational drivers are successfully translated into sustained behavioral outcomes, while others fail to do so.

In addition, this study advances the role of mindfulness in technology adoption research by examining it as a moderator in the relationship between gamification drivers and mediators (attitude towards M-payment and perceived enjoyment). While prior research has highlighted mindfulness primarily as an antecedent of adoption decisions (Sun & Fang, 2010; Flavian et al., 2020), more recent studies have only begun to incorporate mindfulness into technology adoption or merchant-related contexts

(Yuliana, 2025). Moreover, by showing that mindfulness strengthens some pathways (e.g., ownership → attitude) but has no influence on others (e.g., avoidance → enjoyment), this study refines the MTA framework and underscores that mindfulness functions as a selective rather than universal moderator.

Specifically, mindfulness strengthens the relationship between ownership and attitude, highlighting how mindful individuals may be more sensitive to feelings of personal control. In contrast, mindfulness fails to enhance or even diminishes the influence of avoidance on enjoyment, suggesting that mindful users may reject negative or stress-inducing motivators. These findings refine the MTA framework by demonstrating that mindfulness conditions the effectiveness of gamification, offering a more nuanced understanding of user behaviour in adoption during post-endemic contexts.

Finally, to the best of the researcher's knowledge, limited studies have integrated selected Octalysis drivers, affective mediators, and mindfulness within a QR-code mobile payment continuance context. While studies on continuance intention exist in countries such as Bangladesh (Rahman et al., 2023) and Thailand (Chaveesuk et al., 2022), they have not incorporated detailed gamification drivers nor employed mindfulness as a moderator.

Similarly, although research in Malaysia has explored e-wallet adoption and continuance intention (Ahmad & Ghazali, 2024), none have applied the Octalysis framework or integrated mindfulness in a post-COVID QR payment context. By addressing these gaps, this study offers a holistic theoretical lens that bridges motivational, affective, and cognitive factors to explain long-term use of mobile payment services, thereby addressing a critical gap in both gamification and mobile payment literature.

Overall, this study contributes to the literature by extending QR-code mobile payment continuance research through the integration of selected Octalysis drivers, affective mediators, and mindfulness. It provides empirical evidence on how motivational, affective, and cognitive factors interact to explain continued usage behaviour in the post-adoption stage of mobile payment services.

5.3.2 Practical Contributions

Beyond its theoretical value, this study provides important practical implications for sustaining the use of QR-code-based mobile payments in Malaysia's post-endemic

economy. The urgency of contactless payments that drove adoption during COVID-19 has diminished, making continuance intention a pressing challenge. By identifying which gamification drivers are effective, how enjoyment and attitudes mediate user behaviour, and how mindfulness conditions these effects, this research offers actionable guidance for practitioners and policymakers aiming to maintain engagement with QR payments. In Malaysia's post-endemic context, these findings are valuable for guiding investment, design, and marketing decisions (Chong et al., 2023).

First, the results show that not all gamification drivers are equally effective. Ownership, unpredictability, and avoidance were found to have no significant influence on either user attitude or enjoyment. Practically, this indicates that service providers should not overemphasize features that only create a sense of possession, surprise elements, or fear-of-loss mechanics, as they do not meaningfully sustain engagement in financial transactions. Therefore, providers should avoid allocating substantial resources to these mechanisms unless they are redesigned according to user expectations and re-tested within the QR-code mobile payment context. Instead, resources should be directed toward gamification elements that create clear meaning, promote user development, or directly enhance enjoyment through rewards and ease of use. This evidence-based approach enables providers to prioritize gamification investments that demonstrate stronger behavioural relevance rather than adopting gamification features simply because they are popular in other digital service contexts. By ruling out weaker drivers, this study helps practitioners avoid wasting efforts on gamification strategies that offer little practical impact (Hamari, 2020).

Second, despite ownership showing no direct influence on attitude or enjoyment, the moderation analysis revealed that mindfulness significantly strengthens the relationship between ownership and attitude (H11c). This has an important practical implication: while ownership itself is not universally impactful, it becomes meaningful for users who are more mindful and reflective. For this segment of users, emphasizing features that highlight personal control, security, or contextual benefits of QR payments may successfully enhance positive attitudes. For example, providers can introduce personalized dashboards, transaction management features, or security-control options that reinforce users' sense of autonomy and ownership over their digital payment decisions. Providers may therefore adopt a more segmented strategy, designing ownership-related features for mindful users while focusing on other motivators for the broader user base (Brown & Ryan, 2021; Bishop et al., 2022).

Third, the significant but negative moderation of mindfulness on the relationship between social influence and attitude (H11d) highlights a critical practical insight. In practice, this means that while social campaigns, peer usage, or influencer endorsements may still work for less mindful users, they lose effectiveness or even backfire among highly mindful individuals, who prefer to rely on personal judgment rather than external cues. For marketers, this calls for a dual strategy: social-based promotions for users with lower mindfulness, and personalized, autonomy-focused messaging for more mindful users. Rather than relying solely on social pressure, providers should combine social proof with informative communication that allows users to independently evaluate the value and reliability of QR payments. This also signals the need for caution in over-relying on collectivist appeals when targeting a more reflective segment of the population (Alkire et al., 2021; Yang, 2022).

Fourth, the findings confirm that meaning and social influence are the strongest drivers shaping both user attitude and enjoyment, which in turn lead to continuance intention. Practically, this highlights the importance of framing QR payments as both purposeful (e.g., safe, innovative, and socially beneficial) and socially relevant (e.g., endorsed by peers, communities, or society at large). Providers can therefore design campaigns that highlight both the symbolic meaning (such as contributing to a cashless society or sustainable innovation) and the social proof (such as showing community adoption and group benefits). For instance, meaning-based campaigns can communicate how QR payments support financial convenience, digital inclusion, and national digital transformation, while social proof strategies can showcase merchant acceptance, community adoption, and trusted user experiences. By doing so, they can tap into both the cognitive and emotional sides of user motivation, creating deeper engagement that extends beyond basic functionality (Chong, 2021; Teo et al., 2022).

Fifth, the results also show that development influences enjoyment but not attitude. This suggests that gamification features that reward users for progress, skill, or achievement can still enhance enjoyment, but they do not necessarily change how users evaluate the payment system overall. Practically, providers should integrate simple progress-based mechanics, such as tiered reward systems or milestone achievements, but not rely on these to shape user attitudes directly. These mechanisms should be designed as enjoyment-oriented rewards that provide positive experiences without increasing transaction complexity. For example, providers may incorporate personalized rewards, achievement milestones, or engaging challenges that encourage

continued interaction while maintaining the simplicity expected from payment applications. Instead, such features should be seen as complementary hedonic tools that sustain enjoyment, which in turn supports continuance intention. This helps practitioners design balanced gamification systems where development-based incentives reinforce user satisfaction even if they do not shift perceptions (Xi & Hamari, 2022).

Sixth, the mediating roles of attitude and enjoyment provide additional guidance. Both were found to significantly influence continuance intention, meaning that practical strategies must simultaneously target positive evaluations of QR payments (attitude) and hedonic experiences of usage (enjoyment). For providers, this calls for a dual-track approach: ensuring functional reliability and symbolic value to strengthen attitudes, while also maintaining rewarding, fun, and interactive elements to sustain enjoyment. In particular, attitude-building strategies should include trust cues such as transparent security communication, reliable transaction performance, clear privacy assurance, and user education to strengthen confidence in continued usage. Together, these mediators explain why some gamification drivers are more effective than others, offering a clear roadmap for designing user-centered mobile payment experiences (Zhang et al., 2023).

Finally, these findings have implications for policymakers and consumer education. Since mindfulness reduces reliance on social pressure, promoting digital literacy and reflective financial decision-making can empower users to adopt mobile payments based on personal evaluation rather than external influence. This supports Malaysia's broader digital economy goals by encouraging responsible, independent, and sustainable use of mobile payment technologies (Chong et al., 2023).

5.4 Limitations

This study has several limitations that need to be acknowledged. The research was carried out in the specific context of QR-code mobile payments in Malaysia. While this gives useful insights into a fast-growing payment method in an emerging market, the results may not be easily generalized to other payment technologies such as NFC-based systems, mobile banking apps, or digital wallets in different countries. Differences in culture and technology use may lead to different findings, which limits the broader application of this study. Furthermore, the study focused exclusively on QR-code mobile payments and did not examine other payment technologies, thereby

limiting the scope of the findings. In addition, the respondents were primarily drawn from the Central Klang Valley region, which may not fully represent mobile payment users from other regions of Malaysia with different socioeconomic and technological characteristics.

Another limitation relates to the demographic composition of the sample. Female respondents represented 69.7% of the total sample, while 67.6% were aged between 18 and 23 years old. Although these distributions reflect the characteristics of the respondents obtained through the purposive sampling approach, they may limit the extent to which the findings can be generalized to the broader population of mobile payment users in Malaysia. Younger users are generally more familiar with digital technologies and mobile payment services, and therefore may exhibit different perceptions and continuance behaviors compared to older users. Nevertheless, as the primary objective of this study was to examine the relationships among the proposed constructs rather than demographic differences, these imbalances are unlikely to affect the validity of the hypothesized relationships. Future studies are encouraged to obtain more balanced demographic representation to enhance the generalizability of the findings. Moreover, the use of purposive sampling as a non-probability sampling technique may further restrict the generalizability of the findings, as not all members of the target population had an equal chance of being selected.

Not just that, the research design is cross-sectional, which means it cannot establish causality or show how user behavior may change over time. Attitudes, perceived enjoyment, and continuance intention could evolve with longer use or exposure to new gamification features. Therefore, future studies using longitudinal or experimental designs may provide a better understanding of these changes. In addition, the study relied on self-reported responses collected through a single survey instrument. As a result, the findings may be subject to self-report bias, including social desirability and response consistency effects. Although procedural and statistical measures were employed to minimize common method bias, common method concerns cannot be entirely ruled out because all constructs were measured from the same respondents at a single point in time. Furthermore, the study focused on users' perceptions and intentions rather than actual transaction records or observed usage behaviour. Consequently, the findings may not fully capture real-world mobile payment usage patterns.

Although this study used the Octalysis framework to examine selected gamification drivers (meaning, ownership, development, social influence,

unpredictability and avoidance), two core drivers namely scarcity and empowerment were excluded because they were less relevant to the context of QR-code mobile payments in Malaysia. Empowerment of creativity and feedback represents the progress consumers make when they try new things, explore options, and receive feedback to adjust their behavior (Chou, 2014). However, mobile payment systems in Malaysia are designed to be simple, functional, and easy to use, with standardized interfaces that require very little creative process. The design and convenience of e-payment systems significantly influence consumers' intention to use them, highlighting the importance of ease of use (Lai, 2015). Previous research has shown that technology adoption is often influenced by ease of use (Püschel et al., 2010; Sripalawat et al., 2011), and in this case, users engage in fewer creative activities when using QR payments. For this reason, empowerment was excluded.

Similarly, scarcity and impatience refer to the desire for something rare, exclusive, or difficult to obtain. In the Malaysian context, this is not relevant because mobile payments have become ubiquitous and users are offered many alternatives. Empirical research shows that mobile payment systems are widely adopted across Malaysia, with users increasingly relying on cashless transactions in daily life (Rahman, Ismail, & Bahri, 2020). Therefore, scarcity was also excluded. While this decision makes sense in the present context, leaving out these two drivers may limit the comprehensiveness of the gamification model tested in this study. Their potential influence on continuance intention remains unexplored and could provide valuable insights in future studies

Besides, mindfulness in this study was examined only as a trait variable. While this helps to capture differences in how individuals reflect and stay aware, it does not consider state-level mindfulness, which can change depending on context or app features. This limits the ability to fully explain the role of mindfulness in post-adoption behavior. Finally, the study was conducted in the post-endemic COVID-19 context. At this stage, the reasons for adopting mobile payment had already shifted from safety and hygiene concerns toward convenience, enjoyment, and habit. Therefore, the findings may reflect only this transitional phase of consumer behavior, which may differ from pre-pandemic motivations or future drivers shaped by new fintech developments.

Despite these limitations, the study provides useful theoretical and practical contributions to understanding the role of gamification and mindfulness in continuance

intention. It also opens clear opportunities for future research to extend and refine the current findings.

5.5 Recommendations for Future Research

Building on the limitations discussed earlier, several directions for future research can be suggested. Future studies could expand the geographical scope by testing this model in different cultural and regulatory contexts. Because mobile payment adoption is influenced by institutional settings, consumer trust, and societal values, applying the framework in both emerging and developed markets would improve generalizability and allow meaningful cross-country comparisons.

Next, future research could explore other types of mobile financial services beyond QR-code payments. Examples include NFC-based payments, mobile banking apps, or cryptocurrency wallets, each of which may involve different user experiences, technologies, and gamification potentials. Comparing across payment technologies would clarify whether the effects of gamification and mindfulness are consistent across domains or context-specific.

In addition, adopting longitudinal or mixed-method approaches would provide richer insights into how user perceptions evolve over time. Since this study used a cross-sectional design, it only captured a snapshot of user attitudes and enjoyment. Longitudinal studies could track how continuance intention changes as users gain experience, respond to incentives, or face challenges. Meanwhile, qualitative methods such as interviews or focus groups could uncover deeper perspectives on how gamification and mindfulness influence user experiences.

Furthermore, future studies could employ multi-group analysis to examine whether the relationships proposed in this study differ across user segments. Comparisons based on age, gender, mobile payment experience, frequency of QR-code usage, geographical location, or levels of mindfulness may reveal important differences in how users respond to gamification mechanisms. Such analyses would provide a more nuanced understanding of continuance behaviour and help determine whether the effects identified in this study are consistent across different user groups.

Furthermore, future studies could broaden the scope of gamification drivers. Other drivers like scarcity and empowerment were excluded due to their limited relevance to QR-code payments in Malaysia. However, these drivers may provide additional explanatory value in fintech contexts where users engage with more

interactive, personalized, or reward-based features. For example, empowerment emphasizes user creativity and feedback loops, which are less applicable to the simplicity of QR payments but may be highly relevant in services offering customization or personalization. Future research could empirically examine whether empowerment influences users' attitudes and engagement by enhancing perceived control, autonomy, and active participation in digital financial experiences. Similarly, scarcity mechanics such as limited-time rewards or exclusive access could be powerful motivators in other fintech contexts. Future studies may investigate whether scarcity-based mechanisms strengthen engagement, perceived enjoyment, or continuance intention through feelings of exclusivity, urgency, or perceived value. Incorporating these drivers in future research may provide a more complete view of how gamification shapes user engagement.

Finally, mindfulness could be examined in greater depth by distinguishing between trait-level and state-level mindfulness. Experimental studies, for instance, could test how design features or mindfulness prompts temporarily heighten awareness and influence user behavior. This would show how mindfulness functions not only as a stable personal trait but also as a dynamic state shaped by technology design. In conclusion, future research can extend this study by diversifying contexts, methods, and constructs. Doing so will enrich theoretical understanding while offering practical guidance for fintech providers seeking to design more engaging, mindful, and sustainable mobile payment ecosystems.

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APPENDICES

APPENDIX 1
Original Scales items (Prior to being modified)

Appendix 1.1: Octalysis Gamification

Meaning (Epic meaning and Calling) **Brito et al. (2018)* & Li et al. (2021)****

1. I feel motivated to use a GApp that helps me contribute to a better world. ("Every time you get it right, we will plant a tree")*
2. I feel motivated to use a GApp through which I can contribute to a greater cause.*
3. I feel motivated to use a GApp when it makes me feel as if I am the only person that can win a challenge. ("The Chosen One")*
4. I feel motivated to use this mobile fitness App that helps me to be more fit**
5. I feel motivated to use this mobile fitness App through which I can improve my health**
6. I feel motivated to use this mobile fitness App when it makes me feel as if I am the only person that can win the exercise challenge**

Development (Development and Accomplishment) **Brito et al. (2018)* & Gómez-Cambronero et al. (2023)****

1. I prefer GApps that give me a sense of achievement when I win a complex challenge*
2. I feel motivated and perform actions that give me points in a GApp.*
3. Makes me feel that I need to complete things**
4. Pushes me to strive for Accomplishments**

Ownership (Ownership and Possession) **Brito et al. (2018)**

1. I prefer GApps that allow me to collect virtual items or resources.
2. I am driven to finish tasks in a GApp to complete a collection of rewards I have begun to collect.
3. I prefer GApps that give me benefits or rewards for my efforts.
4. I prefer GApps that link me to items, attributes or characters to the point that I care about them.

Social influence (Social influence and Relatedness) **Brito et al. (2018)**

1. I prefer GApps where I can add people on a list of friends.
2. I prefer GApps that let me show or share my achievements implicitly.

3. I am motivated to use GApps with locations to share ideas and talk with other people.
4. I prefer GApps that allow me to orient or be oriented by other people.
5. I prefer GApps that let me interact with other people in a few easy steps.

Unpredictability (Unpredictability and Curiosity) **Brito et al. (2018)* and Acikgoz et al. (2023)****

1. I am motivated to perform actions that give me a surprise reward in the GApp.*
2. It motivates me to know I can win a reward at any time when I use the GApp.*
3. I often read advertisements just out of curiosity. **

Avoidance (Loss and Avoidance) **Brito et al. (2018)**

1. I continue using a GApp even after I get tired of it to avoid losing my progress.
2. I am motivated to perform an action quicker in order not to miss a unique opportunity in the GApp.
3. I feel motivated to continue progressing when other people can see I am falling behind in the Gapp

Appendix 1.2: Mindfulness

Engagement with technology **Flavian et al. (2020)**

1. I engaged in the investigation of mobile payment when making the adoption decision
2. I gathered factual information about mobile payment before making the adoption decision
3. I explored mobile payment before I adopted it

Technological novelty seeking **Flavian et al. (2020)**

1. I noted the differences between mobile payment and alternative payment methods I previously used
2. I identified how mobile payment is unique in relation to alternative payment methods
3. I was mindful about how mobile payment differed from alternative payment methods

Awareness of local context **Flavian et al. (2020)**

1. When making the decision to adopt mobile payment, I thought about how it might help my purchase experience
2. When making the decision to adopt mobile payment, I thought about how it might change my purchase experience
3. When making the decision to adopt mobile payment, I thought about how it might be compatible with my purchase requirements

Cognizance of alternative technologies **Flavian et al. (2020)**

1. I considered alternative views regarding mobile payment before making the adoption decision.
2. I was aware of alternative payment methods to mobile payment before deciding to adopt it.
3. I considered equivalent alternative payment methods to meet my needs before deciding to adopt mobile payment.
4. I considered alternative payment methods to meet my needs when deciding to adopt mobile payment.

Appendix 1.3: Attitude towards Mpayment (Wong et al., 2022)

1. All things considered, I find using WeChat Pay to be a good idea
2. All things considered, I find using WeChat Pay to be a positive thing
3. All things considered, I find using WeChat Pay to be favorable

Appendix 1.4: Perceived enjoyment (Giovanni et al., 2015)

1. "I find m-commerce entertaining".
2. "I find m-commerce pleasant".
3. "I find m-commerce exciting".
4. "I find m-commerce fun".

Appendix 1.5: Mpay Continuance intention Akdim et al. (2022)* and Hsieh (2021)**

1. I intend to continue using this social mobile App in the future.*
2. I expect to continue using this social mobile App in the future.*
3. I will keep using this social mobile App as regularly as I do now.*
4. I have decided to switch to e-Health Pay for paying my medical bills.**

APPENDIX 2
Questionnaire

PREDICTING M-PAYMENT CONTINUANCE INTENTION THROUGH GAMIFICATION: THE MODERATING ROLES OF MINDFULNESS

I am a PhD candidate in Business Management currently working on dissertation paper titled "Predicting M-Payment Continuance Intention through Gamification: The Moderating Roles of Mindfulness." I kindly invite your participation in a questionnaire survey integral to my research.

I pledge that all your provided information will be kept **confidential and used for academic research purposes only**. For further inquiries, please do not hesitate to contact me at 016-9209953 or fatenaisyah95@yahoo.com.

Thank you for your time and cooperation in completing the questionnaires. Your contribution is highly valued.

MERAMALKAN NIAT BERTERUSAN MENGGUNAKAN PEMBAYARAN MUDAH ALIH MELALUI GAMIFIKASI: PERANAN MODERASI KESEDARAN

Saya adalah calon PhD dalam bidang Pengurusan Perniagaan, kini sedang menjalankan kertas disertasi bertajuk "Meramalkan Niat Berterusan Menggunakan Pembayaran Mudah Alih melalui Gamifikasi: Peranan Moderasi Kesedaran." Saya dengan hormat menjemput penyertaan anda dalam kaji selidik yang merupakan sebahagian penting daripada kajian saya.

*Saya memberi jaminan bahawa semua maklumat akan **dirahsiakan dan hanya akan digunakan untuk tujuan penyelidikan akademik**. Sekiranya anda mempunyai sebarang pertanyaan, sila hubungi saya di 016-9209953 atau emel kepada fatenaisyah95@yahoo.com.*

Terima kasih atas masa dan kerjasama anda dalam melengkapkan kaji selidik ini. Sumbangan anda amat dihargai.

Prepared by / *Disediakan oleh:*

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INTRODUCTION: QR-CODE MOBILE PAYMENT

QR code mobile payment is a contactless payment method that allows users to make a payment by scanning a QR code from a mobile app. It is an alternative to traditional electronic funds transfer at point of sale using a payment terminal, and it avoids much of the infrastructure associated with electronic payments. To make a QR code payment, the consumer scans the QR code displayed by the merchant with their smartphone, enters the amount they have to pay, and submits the payment. This method has become popular in various countries and is known for its ease of use, security, and ability to facilitate faster payments

Pembayaran menggunakan kod QR adalah kaedah pembayaran tanpa sentuh yang membolehkan pengguna membuat pembayaran dengan mengimbas kod QR melalui aplikasi mudah alih. Ia adalah alternatif kepada pemindahan wang elektronik yang lama menggunakan terminal pembayaran, dan ia dapat mengurangkan banyak infrastruktur yang terlibat dalam pembayaran elektronik. Untuk membuat pembayaran menggunakan kod QR, pengguna hanya perlu mengimbas kod QR yang dipaparkan oleh peniaga, lalu memasukkan jumlah yang perlu dibayar, dan menghantar pembayaran. Kaedah ini telah menjadi popular di pelbagai negara dan dikenali kerana kemudahan penggunaannya, keselamatan, dan keupayaannya untuk mempercepatkan pembayaran.



Please tick **(√)** at the suitable answer.
Sila tandakan (√) pada jawapan yang sesuai.

1. Have you purchased goods or services by scanning QR codes via a mobile payment app in the past two months? / ***Adakah anda pernah membeli barangan atau perkhidmatan dengan mengimbas kod QR melalui aplikasi pembayaran mudah alih dalam tempoh dua bulan yang lalu?***

☐ Yes / ***Ya*** ☐ No / ***Tidak***

2. Identify a specific mobile payment app that you are currently using. If you use more than one mobile payment app, select the one that you are most familiar with. / ***Sila kenal pasti aplikasi pembayaran mudah alih yang sedang anda gunakan. Jika anda menggunakan lebih daripada satu aplikasi pembayaran mudah alih, sila pilih yang anda paling kerap gunakan.***

☐ Touch and Go E-wallet
☐ Boost
☐ GrabPay
☐ Setel
☐ Maybank2U / MAE
☐ Cimb Click / OCTO
☐ Bank Islam Go App

SECTION A: DEMOGRAPHIC PROFILE

Please tick **(√)** at the suitable answer.
Sila tandakan (√) pada jawapan yang sesuai.

1. Gender / *Jantina*:

☐ Male / ***Lelaki***

☐ Female / **Perempuan**

2. Age / *Umur*:

☐ 18-23 years old/***18-23 tahun***

☐ 24-29 years old/***24-29 tahun***

☐ 30-34 years old/***30-34 tahun***

☐ 35-39 years old/***35-39 tahun***

☐ 40-44 years old/***40-44 tahun***

☐ 45-49 years old/***45-49 tahun***

☐ 50-54 years old/***50-54 tahun***

☐ 55 years and above /***55 tahun dan ke atas***

3. How much is the range of income/allowance spending per month? / *Berapa anggaran pendapatan atau elaun yang dibelanjakan setiap bulan?*

☐ RM50

☐ RM100

☐ RM150

☐ RM200

☐ RM250

☐ RM300

☐ RM350

☐ RM400

☐ RM450

☐ RM500

☐ RM550

☐ RM600

☐ RM650

☐ RM700

☐ RM750

☐ RM800

☐ RM850

☐ RM900

☐ RM950

☐ RM1000 and above / ***RM1000 dan ke atas***

4. Usage frequency (per week) using the identified mobile payment / *Kekerapan penggunaan (setiap minggu) pembayaran mudah alih yang dipilih:*

☐ 1-3 per month/***1-3 setiap bulan***

☐ 1-2 per week/***1-2 setiap minggu***

☐ 3-4 per week/***3-4 setiap minggu***

☐ 5-6 per week/***5-6 setiap minggu***

☐ 7-8 per week/***7-8 setiap minggu***

☐ 9-10 per week/***9-10 setiap minggu***

☐ 11-12 per week/***11-12 setiap minggu***

☐ 13 times and above per week /***13 kali dan ke atas setiap minggu***

5. How much is the range of monthly sundry or retail expenditures (including food) using the identified mobile payment / *Berapa anggaran perbelanjaan runcit atau pelbagai (termasuk makanan) setiap bulan yang menggunakan pembayaran mudah alih dipilih:*

☐ RM1-RM49	☐ RM200-RM249
☐ RM50-RM99	☐ RM250-RM499
☐ RM100-RM149	☐ RM500-RM999
☐ RM150-RM199	☐ RM1000 and above / ***RM1000 dan ke atas***

6. How long is your experience using the identified mobile payment app? / *Berapa lama pengalaman anda menggunakan aplikasi pembayaran mudah alih yang dipilih?*

☐ 1-3 months /***1-3 bulan***	☐ 1 years / ***1 tahun***
☐ 4-6 months / ***4-6 bulan***	☐ 2 years / ***2 tahun***
☐ 6-9 months / ***6-9 bulan***	☐ 3 years and above / ***3 tahun dan ke atas***
☐ 10-12 months / ***10-12 bulan***	

SECTION B: MEANING / *MAKNA*

Using scale below, please tick **(√)** at the suitable answer.
Dengan menggunakan skala di bawah, sila tandakan (√) pada jawapan yang sesuai.

Strongly disagree / *Sangat tidak setuju*	Disagree / *Tidak setuju*	Neither agree not disagree / *Neutral*	Agree / *Setuju*	Strongly agree / *Sangat setuju*
1	2	3	4	5

INSTRUCTION: Please (/) in the box provided.
ARAHAN: Tandakan (/) pada ruangan yang disediakan.

	1	2	3	4	5
1. I feel that my mobile payment transactions have a meaningful impact on society *Saya rasa transaksi pembayaran mudah alih saya memberi impak yang bermakna kepada masyarakat.*					
2. I feel a sense of purpose when making mobile payments, as it connects to a larger goal. *Saya merasa mempunyai tujuan apabila membuat pembayaran mudah alih, kerana ia berkait dengan matlamat yang lebih besar.*					
3. The mobile payment app allows me to contribute to a better world *Aplikasi pembayaran mudah alih membolehkan saya menyumbang ke arah dunia yang lebih baik.*					
4. The mobile payment app enables me to contribute to the greater good. *Aplikasi pembayaran mudah alih membolehkan saya menyumbang kepada kebaikan yang lebih besar.*					

SECTION C: DEVELOPMENT/ *PERKEMBANGAN*

Using scale below, please tick **(√)** at the suitable answer.
Dengan menggunakan skala di bawah, sila tandakan (√) pada jawapan yang sesuai.

Strongly disagree / *Sangat tidak setuju*	Disagree / *Tidak setuju*	Neither agree not disagree / *Neutral*	Agree / *Setuju*	Strongly agree / *Sangat setuju*
1	2	3	4	5

INSTRUCTION: Please (/) in the box provided.
ARAHAN: Tandakan (/) pada ruangan yang disediakan.

	1	2	3	4	5
1. I feel a sense of accomplishment when I successfully complete a challenge in the mobile payment app. *Saya merasa puas hati apabila berjaya menyelesaikan cabaran dalam aplikasi pembayaran mudah alih.*					
2. I feel motivated to gain points or rewards in the mobile payment app. *Saya merasa terdorong untuk memperoleh mata atau ganjaran dalam aplikasi pembayaran mudah alih.*					
3. I feel that I need to complete the tasks/challenges offered in the mobile payment app. *Saya merasa perlu untuk menyelesaikan tugas/cabaran yang ditawarkan dalam aplikasi pembayaran mudah alih.*					
4. The tasks/challenges in the mobile payment app pushes me to strive for accomplishments. *Tugas/cabaran dalam aplikasi pembayaran mudah alih mendorong saya untuk berusaha mendapatkan pencapaian.*					

SECTION D: OWNERSHIP / *PEMILIKAN*

Using scale below, please tick **(√)** at the suitable answer.
Dengan menggunakan skala di bawah, sila tandakan (√) pada jawapan yang sesuai.

Strongly disagree / *Sangat tidak setuju*	Disagree / *Tidak setuju*	Neither agree not disagree / *Neutral*	Agree / *Setuju*	Strongly agree / *Sangat setuju*
1	2	3	4	5

INSTRUCTION: Please (/) in the box provided.
ARAHAN: Tandakan (/) pada ruangan yang disediakan.

	1	2	3	4	5
1. I feel proud of what I own when I earn reward points in this mobile payment app. *Saya merasa bangga dengan apa yang saya miliki apabila saya memperoleh mata ganjaran dalam aplikasi pembayaran mudah alih ini.*					
2. I care about the reward points that I've earned through this mobile payment app. *Saya mengambil berat tentang mata ganjaran yang telah saya peroleh melalui aplikasi pembayaran mudah alih ini*.					
3. I feel a deep sense of belonging to this mobile payment app when I accumulate reward points. *Saya merasa satu ikatan yang mendalam dengan aplikasi pembayaran mudah alih ini apabila saya mengumpul mata ganjaran.*					
4. I have a strong sense of ownership of the reward points I've gained in this mobile payment app. *Saya mempunyai rasa pemilikan yang kuat terhadap mata ganjaran yang telah saya peroleh dalam aplikasi pembayaran mudah alih ini.*					

SECTION E: SOCIAL INFLUENCE / *PENGARUH SOSIAL*

Using scale below, please tick **(√)** at the suitable answer.
Dengan menggunakan skala di bawah, sila tandakan (√) pada jawapan yang sesuai.

Strongly disagree / *Sangat tidak setuju*	Disagree / *Tidak setuju*	Neither agree not disagree / *Neutral*	Agree / *Setuju*	Strongly agree / *Sangat setuju*
1	2	3	4	5

INSTRUCTION: Please (/) in the box provided.
ARAHAN: Tandakan (/) pada ruangan yang disediakan.

	1	2	3	4	5
1. I can add my friends and family to a list of favorite recipients using this mobile payment app. *Saya boleh menambah rakan-rakan dan keluarga saya ke dalam senarai penerima kegemaran menggunakan aplikasi pembayaran mudah alih ini.*					
2. I can easily transfer money to my friends and family using this mobile payment app. *Saya dengan mudah boleh memindahkan wang kepada rakan-rakan dan keluarga saya menggunakan aplikasi pembayaran mudah alih ini.*					
3. I feel a sense of connection when my friends and family also use mobile payments. *Saya merasa satu ikatan apabila rakan-rakan dan keluarga saya juga menggunakan pembayaran mudah alih.*					
4. Having a network of friends and family who use mobile payments inspires me to do the same. *Mempunyai rangkaian rakan-rakan dan keluarga yang menggunakan pembayaran mudah alih memberi inspirasi kepada saya untuk melakukan perkara yang sama.*					

SECTION F: UNPREDICTABILTY/ *KETIDAKPASTIAN*

Using scale below, please tick **(√)** at the suitable answer.
Dengan menggunakan skala di bawah, sila tandakan (√) pada jawapan yang sesuai.

Strongly disagree / *Sangat tidak setuju*	Disagree / *Tidak setuju*	Neither agree not disagree / *Neutral*	Agree / *Setuju*	Strongly agree / *Sangat setuju*
1	2	3	4	5

INSTRUCTION: Please (/) in the box provided.
ARAHAN: Tandakan (/) pada ruangan yang disediakan.

	1	2	3	4	5
1. I am interested in finding out the rewards this mobile app will offer in the next update. *Saya berminat untuk mengetahui ganjaran yang akan ditawarkan oleh aplikasi mudah alih ini dalam kemas kini seterusnya.*					
2. I am interested in finding out the features this mobile app will offer in the update. *Saya berminat untuk mengetahui ciri-ciri yang akan ditawarkan oleh aplikasi mudah alih ini dalam kemas kini seterusnya.*					
3. I am curious about the rewards this mobile payment app will offer in the next update. *Saya ingin tahu tentang ganjaran yang akan ditawarkan oleh aplikasi pembayaran mudah alih ini dalam kemas kini seterusnya.*					
4. I am curious about the features this mobile payment app will offer in the next update. *Saya ingin tahu tentang ciri-ciri yang akan ditawarkan oleh aplikasi pembayaran mudah alih ini dalam kemas kini seterusnya.*					

SECTION G: AVOIDANCE/ *PENGHINDARAN*

Using scale below, please tick **(√)** at the suitable answer. / *Dengan menggunakan skala di bawah, sila tandakan (√) pada jawapan yang sesuai.*

Strongly disagree / *Sangat tidak setuju*	Disagree / *Tidak setuju*	Neither agree not disagree / *Neutral*	Agree / *Setuju*	Strongly agree / *Sangat setuju*
1	2	3	4	5

INSTRUCTION: Please (/) in the box provided.
ARAHAN: Tandakan (/) pada ruangan yang disediakan.

	1	2	3	4	5
1. I do not want to miss any of the offers provided by this mobile payment app. *Saya tidak mahu terlepas sebarang tawaran yang disediakan oleh aplikasi pembayaran mudah alih ini.*					
2. I do not want to lose my progress in accumulating reward points in this mobile payment app. *Saya tidak mahu kehilangan kemajuan saya dalam mengumpul mata ganjaran dalam aplikasi pembayaran mudah alih ini.*					
3. I fear losing potential benefits or rewards offered if I stop using this mobile payment app. *Saya takut kehilangan manfaat atau ganjaran yang berpotensi ditawarkan jika saya berhenti menggunakan aplikasi pembayaran mudah alih ini.*					
4. I fear my accumulated reward points will expire if I stop using this mobile payment app. *Saya takut mata ganjaran yang telah saya kumpulkan akan luput jika saya berhenti menggunakan aplikasi pembayaran mudah alih ini.*					

SECTION H: PREFERENCE FOR THE COLOUR BLUE / *KECENDERUNGAN TERHADAP WARNA BIRU*

INSTRUCTION: Please (/) in the box provided.
ARAHAN: Tandakan (/) pada ruangan yang disediakan.

	1	2	3	4	5
1. I prefer the color blue *Saya gemar dengan warna biru*					
2. I do not like the color blue (reverse coding) *Saya tidak suka warna biru*					
3. I like wearing blue clothes *Saya gemar memakai pakaian berwarna biru*					

SECTION I: ATTITUDE TOWARDS M-PAYMENT/ *SIKAP TERHADAP PEMBAYARAN MUDAH ALIH*

Using scale below, please tick **(√)** at the suitable answer.
Dengan menggunakan skala di bawah, sila tandakan (√) pada jawapan yang sesuai.

Strongly disagree / *Sangat tidak setuju*	Disagree / *Tidak setuju*	Neither agree not disagree / *Neutral*	Agree / *Setuju*	Strongly agree / *Sangat setuju*
1	2	3	4	5

INSTRUCTION: Please (/) in the box provided.
ARAHAN: Tandakan (/) pada ruangan yang disediakan.

	1	2	3	4	5
1. All things considered; I find using this mobile payment app to be a good idea. *Secara keseluruhan, saya rasa menggunakan aplikasi pembayaran mudah alih ini adalah idea yang baik.*					
2. All things considered; I find using this mobile payment app to be a positive thing. *Secara keseluruhan, saya mendapati penggunaan aplikasi pembayaran mudah alih ini adalah sesuatu yang positif.*					
3. All things considered; I find using this the mobile payment app to be favourable. *Secara keseluruhan, saya mendapati penggunaan aplikasi pembayaran mudah alih ini adalah sesuatu yang menguntungkan.*					

4. All things considered, using this this mobile payment app is a wise idea. *Secara keseluruhan, menggunakan aplikasi pembayaran mudah alih ini adalah idea yang bijak.*					

SECTION J: PERCEIVED ENJOYMENT/ *KESERONOKAN YANG DIRASAI*

Using scale below, please tick **(√)** at the suitable answer.
Dengan menggunakan skala di bawah, sila tandakan (√) pada jawapan yang sesuai.

Strongly disagree / *Sangat tidak setuju*	Disagree / *Tidak setuju*	Neither agree not disagree / *Neutral*	Agree / *Setuju*	Strongly agree / *Sangat setuju*
1	2	3	4	5

INSTRUCTION: Please (/) in the box provided.
ARAHAN: Tandakan (/) pada ruangan yang disediakan.

	1	2	3	4	5
1. I find this mobile payment app entertaining *Saya mendapati aplikasi pembayaran mudah alih ini mengasyikkan.*					
2. I find this mobile payment app enjoyable. *Saya mendapati aplikasi pembayaran mudah alih ini menyeronokkan.*					
3. I find this mobile payment app exciting. *Saya mendapati aplikasi pembayaran mudah alih ini mengujakan.*					
4. I find this mobile payment app fun. *Saya mendapati aplikasi pembayaran mudah alih ini menghiburkan.*					

SECTION K: ENGAGEMENT WITH TECHNOLOGY/ *PENGLIBATAN DENGAN TEKNOLOGI*

Using scale below, please tick **(√)** at the suitable answer.
Dengan menggunakan skala di bawah, sila tandakan (√) pada jawapan yang sesuai.

Strongly disagree / *Sangat tidak setuju*	Disagree / *Tidak setuju*	Neither agree not disagree / *Neutral*	Agree / *Setuju*	Strongly agree / *Sangat setuju*
1	2	3	4	5

INSTRUCTION: Please (/) in the box provided.
ARAHAN: Tandakan (/) pada ruangan yang disediakan.

	1	2	3	4	5
1. I did some research on mobile payment before making the adoption decision. *Saya telah melakukan sedikit kajian mengenai pembayaran mudah alih sebelum membuat keputusan untuk menggunakannya.*					
2. I gathered facts about mobile payment before making the adoption decision. *Saya mengumpul maklumat mengenai pembayaran mudah alih sebelum membuat keputusan untuk menggunakannya.*					
3. I explored mobile payment before deciding to use it. *Saya meneroka pembayaran mudah alih sebelum membuat keputusan untuk menggunakannya.*					
4. I examined the functions of mobile payment before deciding to use it. *Saya memeriksa fungsi-fungsi pembayaran mudah alih sebelum membuat keputusan untuk menggunakannya.*					

SECTION L: TECHNOLOGICAL NOVELTY SEEKING/ *MENCARI KEUINIKAN TEKNOLOGI*

Using scale below, please tick **(√)** at the suitable answer.
Dengan menggunakan skala di bawah, sila tandakan (√) pada jawapan yang sesuai.

Strongly disagree / *Sangat tidak setuju*	Disagree / *Tidak setuju*	Neither agree not disagree / *Neutral*	Agree / *Setuju*	Strongly agree / *Sangat setuju*
1	2	3	4	5

INSTRUCTION: Please (/) in the box provided.
ARAHAN: Tandakan (/) pada ruangan yang disediakan.

	1	2	3	4	5
1. I noted the differences between mobile payment and alternative payment methods I previously used. *Saya perhatikan perbezaan antara pembayaran mudah alih dan kaedah pembayaran alternatif lain yang pernah saya gunakan.*					
2. I identified how mobile payment is unique in relation to alternative payment methods. *Saya mengenal pasti bagaimana pembayaran mudah alih adalah unik berbanding kaedah pembayaran alternatif lain.*					
3. I was mindful about how mobile payment differed from alternative payment methods. *Saya memberi perhatian kepada bagaimana pembayaran mudah alih berbeza daripada kaedah pembayaran alternatif lain.*					
4. I noticed the uniqueness of mobile payment as compared to other payment methods. *Saya menyedari keunikan pembayaran mudah alih berbanding dengan kaedah pembayaran lain.*					

SECTION M: AWARENESS OF LOCAL CONTEXT / *KESEDARAN TERHADAP KONTEKS LOKAL*

Using scale below, please tick **(√)** at the suitable answer.
Dengan menggunakan skala di bawah, sila tandakan (√) pada jawapan yang sesuai.

Strongly disagree / *Sangat tidak setuju*	Disagree / *Tidak setuju*	Neither agree not disagree / *Neutral*	Agree / *Setuju*	Strongly agree / *Sangat setuju*
1	2	3	4	5

INSTRUCTION: Please (/) in the box provided.
ARAHAN: Tandakan (/) pada ruangan yang disediakan.

	1	2	3	4	5
1. When making the decision to adopt mobile payment, I thought about how it might help my purchase experience. *Semasa membuat keputusan untuk mengguna pembayaran mudah alih, saya memikirkan bagaimana ia boleh membantu pengalaman pembelian saya.*					
2. When making the decision to adopt mobile payment, I thought about how it might change my purchase experience. *Semasa membuat keputusan untuk menggunakan pembayaran mudah alih, saya memikirkan bagaimana ia mungkin mengubah pengalaman pembelian saya.*					
3. When making the decision to adopt mobile payment, I thought about how it might be compatible with my purchase requirements. *Semasa membuat keputusan untuk menggunakan pembayaran mudah alih, saya memikirkan bagaimana ia mungkin sesuai dengan keperluan pembelian saya.*					
4. When making the decision to adopt mobile payment, I thought about how it might fulfill my shopping needs. *Semasa membuat keputusan untuk menggunakan pembayaran mudah alih, saya memikirkan bagaimana ia mungkin memenuhi keperluan membeli-belah saya.*					

SECTION N: COGNIZANCE OF ALTERNATIVE TECHNOLOGIES /
KESEDARAN TERHADAP TEKNOLOGI ALTERNATIF

Using scale below, please tick **(√)** at the suitable answer.
Dengan menggunakan skala di bawah, sila tandakan (√) pada jawapan yang sesuai.

Strongly disagree / *Sangat tidak setuju*	Disagree / *Tidak setuju*	Neither agree not disagree / *Neutral*	Agree / *Setuju*	Strongly agree / *Sangat setuju*
1	2	3	4	5

INSTRUCTION: Please (/) in the box provided.
ARAHAN: Tandakan (/) pada ruangan yang disediakan.

	1	2	3	4	5
1. I considered alternative views regarding mobile payment before making the adoption decision. *Saya mempertimbangkan pandangan alternatif mengenai pembayaran mudah alih sebelum membuat keputusan untuk menggunakannya.*					
2. I am aware of alternative payment methods to mobile payment before deciding to adopt it. *Saya menyedari kaedah pembayaran alternatif kepada pembayaran mudah alih sebelum membuat keputusan untuk menggunakannya.*					
3. I considered alternative payment methods to meet my needs before deciding to adopt mobile payment. *Saya mempertimbangkan kaedah pembayaran alternatif untuk memenuhi keperluan saya sebelum membuat keputusan untuk menggunakan pembayaran mudah alih.*					
4. I considered alternative payment methods to meet my needs when deciding to adopt mobile payment. *Saya mempertimbangkan kaedah pembayaran alternatif untuk memenuhi keperluan saya ketika membuat keputusan untuk menggunakan pembayaran mudah alih.*					

SECTION O: M-PAYMENT CONTINUANCE INTENTION / *NIAT UNTUK MENERUSKAN PENGGUNAAN PEMBAYARAN MUDAH ALIH*

Using scale below, please tick **(√)** at the suitable answer.
Dengan menggunakan skala di bawah, sila tandakan (√) pada jawapan yang sesuai.

Strongly disagree / *Sangat tidak setuju*	Disagree / *Tidak setuju*	Neither agree not disagree / *Neutral*	Agree / *Setuju*	Strongly agree / *Sangat setuju*
1	2	3	4	5

INSTRUCTION: Please (/) in the box provided.
ARAHAN: Tandakan (/) pada ruangan yang disediakan.

	1	2	3	4	5
1. I intend to continue using this mobile payment app in the future. *Saya berhasrat untuk terus menggunakan aplikasi pembayaran mudah alih ini pada masa depan.*					
2. I expect to continue using this mobile payment app in the future. *Saya menjangka untuk terus menggunakan aplikasi pembayaran mudah alih ini pada masa depan.*					
3. I will keep using this mobile payment app. *Saya akan terus menggunakan aplikasi pembayaran mudah alih ini.*					
4. I have decided to continue using this mobile payment app. *Saya telah memutuskan untuk terus menggunakan aplikasi pembayaran mudah alih ini.*					

End of Questions/ *Soalan Tamat*
Thank you for your participation*/ Terima kasih atas penyertaan anda*

APPENDIX 3
QUESTIONNAIRE VALIDATION FORM (pre-test)

Research Title: PREDICTING M-PAYMENT ADOPTION THROUGH GAMIFICATION: THE MODERATING ROLES OF MINDFULNESS

Dear Prof/Dr,

My name is Faten Aisyah Ahmad Ramli, I am undertaking the above-named research as my thesis undertaking. Currently, I have adapted several instruments to measure the constructs of interest, which are highlighted in the proposed framework shown on the next page. The next stage is to ***validate*** the items. The main objective is to ensure that these items match with their respective operational definitions. I would be grateful if you could spend some time to read through the items and assess their content validity.

Perhaps, there are certain constructs with adapted instruments which need to be simplified due to (1) lengthy wordings, (2) too many items, and (3) ambiguity. The attribute of each set of survey instrument is properly indicated (whether it is originally adapted or a modified version). If the instruments are modified, the original instruments can be referred at the appendix section. Please respond to the exercise indicating whether each item is a perfect match, moderate match or poor match. If the item is considered as a moderate match, please provide the suitable wordings in the comment's column.

The research unit of analysis (and also the respondent) is any individual considered as mobile payment user who use QR-code terminal for payment transactions. The respondents must be users of QR-code based mobile payment and familiar with this method. The number of QR-code scanning usage should be more than 5 times a month and more than 30 times which is considered from the emergence of QR-code based mobile payment especially after the endemic phase. Assumingly, they are accustomed to mobile payment services and have continuance intention to use the service to make transactions. All items in the questionnaire are self-rated by the respondent.
Should you need any clarification, I can be reached at 016-9209953, or fatenaisyah1995@gmail.com. I thank you in advance for your time and expertise.

Faten Aisyah Ahmad Ramli
Ph.D Candidate (Business Management)
Faculty of Business Management, Universiti Teknologi MARA, Shah Alam, Malaysia

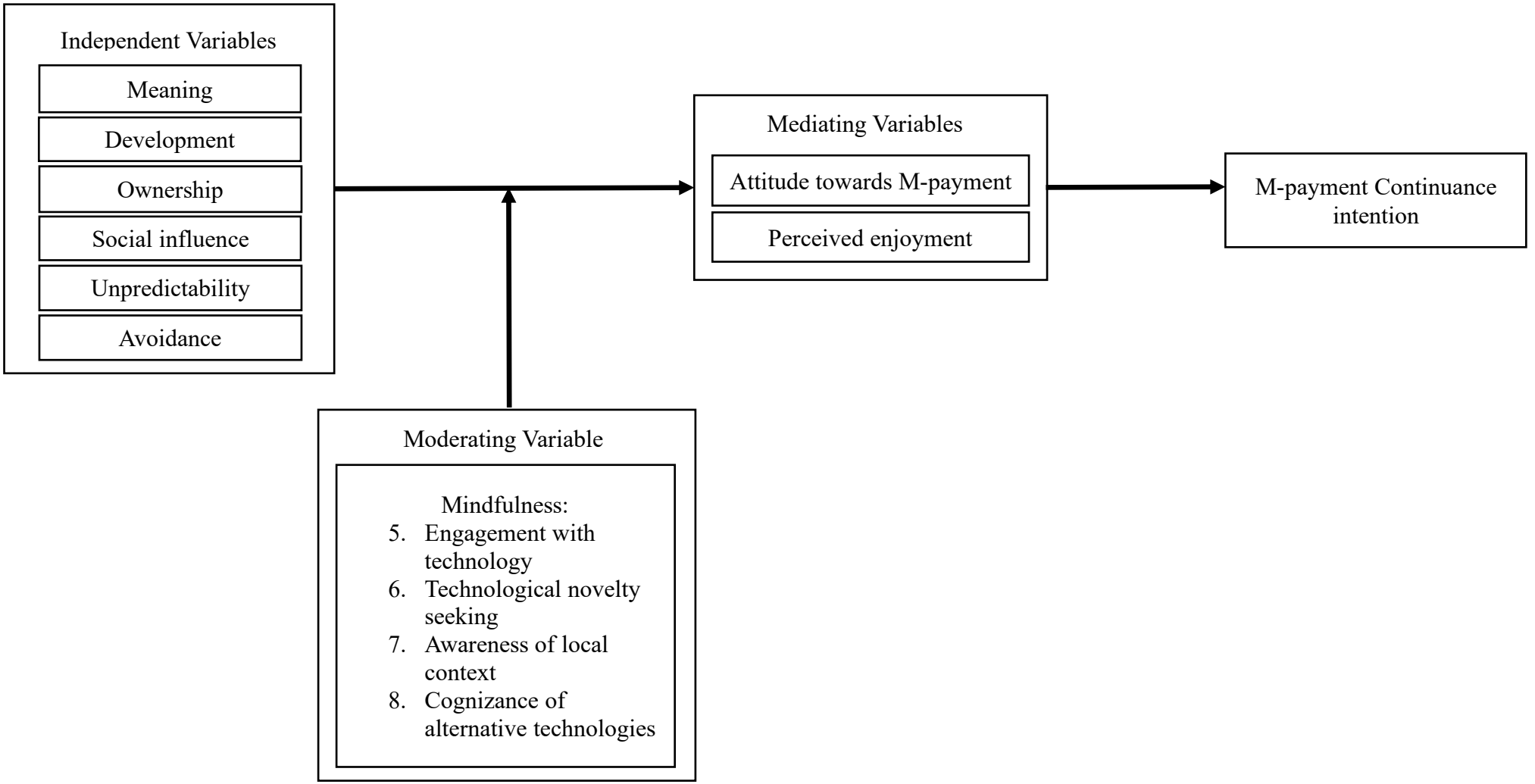

Figure 1 Conceptual framework of the study

Construct (Dimension), Proponents & Scales	Operational Definition & Modifications (if any)	Instruction and Questionnaire Items	Comments	Your Assessment		
				Perfect Match (maintain item as it is)	**Moderate Match** (maintain item but needs some refining)	**Poor Match** (remove item)
Meaning (Epic meaning and Calling) Brito et al. (2018)* and Li et al. (2021)** Scales used: (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree	The user believes that he/she is doing something significant when conducting payment transaction by keep using the payment application in mobile device. The scale items with asterisks (*) are **adapted** from the Purpose (*), Real-world purpose (**). Please refer to Appendix 1 for original items.	**Instruction: Please indicate your agreement or disagreement with the statements by using the scale provided:** 1. The mobile payment app helps me contribute to a positive social impact. *				
		2. The mobile payment app aligns with my personal values. * & **				
		3. The mobile payment app allows me to contribute to the well-being of others. * & **				
		4. I feel that my use of the mobile payment app positively impacts societal well-being. * & **				

Construct (Dimension), Proponents & Scales	Operational Definition & Modifications (if any)	Instruction and Questionnaire Items	Comments	Your Assessment		
				Perfect Match (maintain item as it is)	**Moderate Match** (maintain item but needs some refining)	**Poor Match** (remove item)
Development (Development and Accomplishment) Brito et al. (2018)* and Gómez-Cambronero et al (2023)** Scales used: (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree	An internal motivator for the users in making progress in their life by switching from using cash as a payment method into employing mobile payment application to purchase a good/service and continue the usage after the trial. The scale items with asterisks (*) are **adapted** from the Development (*), Accomplishment (**).	**Instruction: Please indicate your agreement or disagreement with the statements by using the scale provided:** 1. I feel a sense of accomplishment when I successfully complete a challenge in the mobile payment app. *				
		2. I feel motivated to gain points or rewards in the mobile payment app. *				
		3. I feel that I need to complete the tasks/challenges offered in the mobile payment app. **				
		4. The tasks/challenges in the mobile payment app pushes me to strive for accomplishments. **				

Construct (Dimension), Proponents & Scales	Operational Definition & Modifications (if any)	Instruction and Questionnaire Items	Comments	Your Assessment		
				Perfect Match (maintain item as it is)	**Moderate Match** (maintain item but needs some refining)	**Poor Match** (remove item)
	Please refer to Appendix 1 for original items.					
Ownership (Ownership and Possesion) Brito et al. (2018) Scales used: (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree	The users are motivated to use mobile payment method because they feel like they own and control the application. The scale items are **<u>adapted</u>** from Ownership items. Please refer to Appendix 1 & 2 for original items of each constructs.	**Instruction: Please indicate your agreement or disagreement with the statements by using the scale provided:** 1. I feel proud of what I own when I earn reward points in the mobile payment app.				
		2. I care about the reward points that I ’ ve earned through mobile payment app.				
		3. I feel a deep sense of belonging to the mobile payment app when I accumulate reward points.				
		4. I have a strong sense of ownership of the reward points I’ ve gained in the mobile payment app.				

Construct (Dimension), Proponents & Scales	Operational Definition & Modifications (if any)	Instruction and Questionnaire Items	Comments	Your Assessment		
				Perfect Match (maintain item as it is)	**Moderate Match** (maintain item but needs some refining)	**Poor Match** (remove item)
Social Influence (Social influence and Relatedness) Brito et al. (2018) Scales used: (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree	A factor that motivates users to continue using mobile payment application after considering that influential others' opinion in their decision. The scale items are **adapted** from Social influence items Please refer to Appendix 1 for original items.	**Instruction: Please indicate your agreement or disagreement with the statements by using the scale provided:** 1. I can add my friends and family to a list of favorite recipients using this mobile payment app.				
		2. I can easily transfer money to my friends and family using this mobile payment app.				
		3. I feel a sense of connection when my friends and family also use the same mobile payment app.				
		4. Having a network of friends and family who use the mobile payment app inspires me to do the same.				

Construct (Dimension), Proponents & Scales	Operational Definition & Modifications (if any)	Instruction and Questionnaire Items	Comments	Your Assessment		
				Perfect Match (maintain item as it is)	**Moderate Match** (maintain item but needs some refining)	**Poor Match** (remove item)
Unpredictability (Unpredictability and Curiosity) Brito et al. (2018)* and Acikgoz et al (2023)** Scales used: (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree	A state where the users are engaged with mobile payment application because they are curious of what is going to happen next if they continue to use that payment method. The scale items with asterisks (*) are **adapted** from the Unpredictability (*), Curiosity (**). Please refer to Appendix 1 for original items.	**Instruction: Please indicate your agreement or disagreement with the statements by using the scale provided:** 1. The mobile payment app offers many unexpected rewards.*				
		2. The mobile payment app offers many surprising rewards.*				
		3. I often explore the rewards (offered by the mobile payment app) just out of curiosity.**				
		4. I am curious to explore the mobile payment app to discover any unexpected rewards.**				

Construct (Dimension), Proponents & Scales	Operational Definition & Modifications (if any)	Instruction and Questionnaire Items	Comments	Your Assessment		
				Perfect Match (maintain item as it is)	**Moderate Match** (maintain item but needs some refining)	**Poor Match** (remove item)
Avoidance (Avoidance and Loss) Brito et al. (2018) Scales used: (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree	The user's motivation to continue to use the mobile payment method to avoid the loss they will suffer from not employing it in making transactions The scale items are **adapted** from Avoidance (Brito et al., 2018) Please refer to Appendix 1 for original items.	**Instruction: Please indicate your agreement or disagreement with the statements by using the scale provided:** 1. I do not want to miss out on time-limited offers in this mobile payment app				
		2. I do not want to lose my progress in accumulating reward points in this mobile payment app				
		3. I fear losing potential benefits or rewards offered if I stop using this mobile payment app.				
		4. I fear my accumulated reward points will expire if I stop using this mobile payment app.				

Construct (Dimension), Proponents & Scales	Operational Definition & Modifications (if any)	Instruction and Questionnaire Items	Comments	Your Assessment		
				Perfect Match (maintain item as it is)	**Moderate Match** (maintain item but needs some refining)	**Poor Match** (remove item)
Engagement with technology Flavian et al. (2020) Scales used: (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree	The user explores the functionality of mobile payment in detail when adopting it Question 1 is modified and the other scale items are **originally adapted.** Please refer to Appendix 2 for original items.	**Instruction: Please indicate your agreement or disagreement with the statements by using the scale provided:** 1. I did some research into mobile payment when making adoption decision				
		2. I gathered factual information about mobile payment before making the adoption decision				
		3. I explored mobile payment before I adopted it				

Construct (Dimension), Proponents & Scales	Operational Definition & Modifications (if any)	Instruction and Questionnaire Items	Comments	Your Assessment		
				Perfect Match (maintain item as it is)	**Moderate Match** (maintain item but needs some refining)	**Poor Match** (remove item)
Technological novelty seeking Flavian et al. (2020) Scales used: (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree	When adopting mobile payment, a user compares it with other payment methods, such as credit cards and cash, to identify how mobile payment is different The scale items are **originally adapted.** Please refer to Appendix 2 for original items.	**Instruction: Please indicate your agreement or disagreement with the statements by using the scale provided:** 1. I noted the differences between mobile payment and alternative payment methods I previously used				
		2. I identified how mobile payment is unique in relation to alternative payment methods				
		3. I was mindful about how mobile payment differed from alternative payment methods				

Construct (Dimension), Proponents & Scales	Operational Definition & Modifications (if any)	Instruction and Questionnaire Items	Comments	Your Assessment		
				Perfect Match (maintain item as it is)	**Moderate Match** (maintain item but needs some refining)	**Poor Match** (remove item)
Awareness of local context Flavian et al. (2020) Scales used: (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree	Users adopt mobile payment to facilitate their shopping experience The scale items are **originally adapted.** Please refer to Appendix 2 for original items.	**Instruction: Please indicate your agreement or disagreement with the statements by using the scale provided:** 1.When making the decision to adopt mobile payment, I thought about how it might help my purchase experience				
		2.When making the decision to adopt mobile payment, I thought about how it might change my purchase experience				
		3.When making the decision to adopt mobile payment, I thought about how it might be compatible with my purchase requirements				

Construct (Dimension), Proponents & Scales	Operational Definition & Modifications (if any)	Instruction and Questionnaire Items	Comments	Your Assessment		
				Perfect Match (maintain item as it is)	**Moderate Match** (maintain item but needs some refining)	**Poor Match** (remove item)
Cognizance of alternative technologies Flavian et al. (2020) Scales used: (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree	When conducting payment transaction by using mobile payment method, the user is aware of other alternatives such as credit cards or cash. The scale items are **originally adapted.** Please refer to Appendix 2 for original items.	**Instruction: Please indicate your agreement or disagreement with the statements by using the scale provided:** 1. I considered alternative views regarding mobile payment before making the adoption decision.				
		2. I was aware of alternative payment methods to mobile payment before deciding to adopt it.				
		3. I considered equivalent alternative payment methods to meet my needs before deciding to adopt mobile payment.				
		4. I considered alternative payment methods to meet my needs when deciding to adopt mobile payment.				

Construct (Dimension), Proponents & Scales	Operational Definition & Modifications (if any)	Instruction and Questionnaire Items	Comments	Your Assessment		
				Perfect Match (maintain item as it is)	**Moderate Match** (maintain item but needs some refining)	**Poor Match** (remove item)
Attitude towards Mpay Wong et al. (2022) Scales used: (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree	Attitude towards Mpay is the user' tendency and feeling towards mobile payment usage that act as the indicator of the continuance intention to use the app. The scale items are **<u>slightly modified</u>** from 'Attitude towards the use of technology'. "WechatPay" is changed into "this mobile payment app".	**Instruction: Please indicate your agreement or disagreement with the statements by using the scale provided:** 4. All things considered, I find using this mobile payment app to be a good idea				
		2. All things considered, I find using this mobile payment app to be a positive thing				
		3. All things considered, I find using this mobile payment app to be favorable				
		4. All things considered, using this mobile payment app is a wise idea.				

Construct (Dimension), Proponents & Scales	Operational Definition & Modifications (if any)	Instruction and Questionnaire Items	Comments	Your Assessment		
				Perfect Match (maintain item as it is)	**Moderate Match** (maintain item but needs some refining)	**Poor Match** (remove item)
	Please refer to Appendix 3 for original items.					
Perceived enjoyment Giovanni et al (2015) Scales used: (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree	The degree to which mobile payment usage is perceived to be enjoyable, aside from the performance consequences The scale items are **<u>slightly modified</u>**. "M-commerce" is changed into "this mobile payment app". Please refer to Appendix 4 for original items.	**Instruction: Please indicate your agreement or disagreement with the statements by using the scale provided:** 4. I find this mobile payment app entertaining.				
		2. I find this mobile payment app enjoyable.				
		3. I find this mobile payment app exciting.				
		4. I find this mobile payment app fun.				

Construct (Dimension), Proponents & Scales	Operational Definition & Modifications (if any)	Instruction and Questionnaire Items	Comments	Your Assessment		
				Perfect Match (maintain item as it is)	**Moderate Match** (maintain item but needs some refining)	**Poor Match** (remove item)
Mpay continuance intention Akdim et al. (2022)* and Hsieh (2021)** Scales used: (1) Strongly disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly agree	The degree of user's intention to use mobile payment method to make transactions after they have experienced with the app The scale items are **slightly modified**. "Social mobile" is changed into "mobile payment". Question 4 is **adapted** Consumer's intention**	**Instruction: Please indicate your agreement or disagreement with the statements by using the scale provided:** 1. I intend to continue using this mobile payment App in the future.*				
		2. I expect to continue using this mobile payment App in the future.*				
		3. I will keep using this mobile payment App*				
		4. I have decided to continue using this mobile payment app.**				

Construct (Dimension), Proponents & Scales	Operational Definition & Modifications (if any)	Instruction and Questionnaire Items	Comments	Your Assessment		
				Perfect Match (maintain item as it is)	**Moderate Match** (maintain item but needs some refining)	**Poor Match** (remove item)
	Please refer to Appendix 5 for original items.					

APPENDIX 4
Letter Granting for Permission to Conduct a Survey from the Faculty

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UNIVERSITI TEKNOLOGI MARA

Pejabat
Timbalan Naib Canselor
(Penyelidikan dan Inovasi)

Reference : UiTM.800 - 1/1/9
Our reference : REC/10/2025 (PG/MR/551)
Date : 1447H ربيع الأخير 9
01 October 2025

Ms Faten Aisyah Ahmad Ramli - 2022373775
(Supervisor: Assoc. Prof. Dr Muhammad Iskandar Hamzah)
Faculty of Business and Management
UiTM Puncak Alam
42300 Bandar Puncak Alam
SELANGOR

السلام عليكم ورحمة الله وبركاته and Greetings

Ms

APPROVAL LETTER - UiTM RESEARCH ETHICS COMMITTEE

Thank you for submitting your research proposal to the Research Ethics Committee (REC). After considering your application, the Committee approved your proposal titled "Predicting M-Payment Continuance Intention Through Gamification: The Moderating Roles of Mindfulness" in the Central Klang Valley. Details of the approval are as follows:

Ref. number:	REC/10/2025 (PG/MR/551)
Approval Period:	01 October 2025 until 01 January 2026
Authorised personnel:	1. Faten Aisyah Ahmad Ramli 2. Assoc. Prof. Dr Muhammad Iskandar Hamzah

The UiTM Research Ethics Committee operates in accordance with ICH Good Clinical Practice Guidelines, Malaysian Good Clinical Practice Guidelines and the Declaration of Helsinki. The approval of this project is conditional upon your continuing compliance with these guidelines and declaration.

We draw to your attention the requirement that a report on this research, must be submitted every 12 months from the date of the approval or on the completion of the project, whichever occurs first. Failure to submit reports will result in withdrawal of consent for the project to proceed. Amendments, if any, to the study documents are to be submitted to the REC for approval.

If you require further information, please contact the REC Secretariat at 03-55442846/03-55442737 or email at recsecretariat@uitm.edu.my.

اوسها، تقوى، موليا
"MALAYSIA MADANI"
"BERKHIDMAT UNTUK NEGARA"

Yours sincerely,

(EMERITUS PROFESSOR DATO' DR RAYMOND AZMAN ALI)
Chairman
UiTM Research Ethics Committee

c.c.: Deputy Dean (RI), Faculty of Business and Management, UiTM

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APPENDIX 5
Pilot study: reliability and validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Attitude towards M-payment	0.915	0.919	0.940	0.796
Avoidance	0.912	0.920	0.938	0.791
Awareness of local context	0.892	0.897	0.925	0.756
Cognizance of alternative technology	0.809	0.809	0.875	0.637
Development	0.849	0.864	0.897	0.685
Engagement with technology	0.882	0.887	0.918	0.738
M-payment continuance intention	0.915	0.921	0.940	0.798
Meaning	0.755	0.764	0.844	0.576
Mindfulness	0.945	0.947	0.951	0.549
Ownership	0.856	0.856	0.904	0.702
Perceived enjoyment	0.931	0.933	0.951	0.829
Social influence	0.798	0.817	0.868	0.624
Technological novelty seeking	0.897	0.898	0.928	0.764
Unpredictability	0.917	0.923	0.941	0.800

APPENDIX 6
Pilot Study: Heterotrait-Monotrait Ratio (HTMT)

	Attitude towards M-payment	Avoidance	Awareness of local context	Cognizance of alternative technology	Development	Engagement with technology	M-payment continuance intention	Meaning	Mindfulness	Ownership	Perceived enjoyment	Social influence	Technological novelty seeking	Unpredictability
Attitude towards M-payment														
Avoidance	0.387													
Awareness of local context	0.588	0.604												
Cognizance of alternative technology	0.685	0.689	0.818											
Development	0.320	0.830	0.646	0.742										
Engagement with technology	0.536	0.646	0.744	0.835	0.663									
M-payment continuance intention	0.724	0.249	0.452	0.646	0.280	0.463								
Meaning	0.448	0.421	0.529	0.576	0.633	0.424	0.487							
Mindfulness	0.684	0.664	0.932	1.020	0.727	0.954	0.557	0.518						

	Attitude towards M-payment	Avoidance	Awareness of local context	Cognizance of alternative technology	Development	Engagement with technology	M-payment continuance intention	Meaning	Mindfulness	Ownership	Perceived enjoyment	Social influence	Technological novelty seeking	Unpredictability
Ownership	0.409	0.757	0.572	0.664	0.875	0.560	0.325	0.642	0.657					
Perceived enjoyment	0.630	0.566	0.712	0.731	0.630	0.765	0.502	0.523	0.769	0.477				
Social influence	0.650	0.531	0.554	0.550	0.521	0.556	0.537	0.583	0.600	0.580	0.554			
Technological novelty seeking	0.674	0.478	0.687	0.842	0.593	0.743	0.475	0.360	0.937	0.590	0.582	0.514		
Unpredictability	0.453	0.831	0.557	0.684	0.752	0.595	0.373	0.441	0.646	0.730	0.514	0.583	0.518	

APPENDIX 7
Demographics

Case Processing Summary

		UseQR	App	Gender	Age	SpendMo	Freq	MPspend	MPexp
N	Valid	426	426	426	426	426	426	426	426
	Missing	0	0	0	0	0	0	0	0

UseQR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	9	2.1	2.1	2.1
	Yes	417	97.9	97.9	100.0
	Total	426	100.0	100.0	

Most familiar M-payment App

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Touch and Go E-wallet	53	12.4	12.4	12.4
	Boost	2	.5	.5	12.9
	GrabPay	1	.2	.2	13.1
	Setel	3	.7	.7	13.8
	Maybank2u / MAE	130	30.5	30.5	44.4
	Cimb Click / OCTO	35	8.2	8.2	52.6
	Bank Islam GoApp	202	47.4	47.4	100.0
	Total	426	100.0	100.0	

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	297	69.7	69.7	69.7
	Male	129	30.3	30.3	100.0
	Total	426	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-23 years old	288	67.6	67.6	67.6
	24-29 years old	62	14.6	14.6	82.2
	30-34 years old	16	3.8	3.8	85.9
	35-39 years old	17	4.0	4.0	89.9
	40-44 years old	27	6.3	6.3	96.2
	45-49 years old	12	2.8	2.8	99.1
	50-54 years old	3	.7	.7	99.8
	55 years and above	1	.2	.2	100.0
	Total	426	100.0	100.0	

Monthly income/allowance expenditure range

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	RM50	6	1.4	1.4	1.4
	RM100	33	7.7	7.7	9.2
	RM150	43	10.1	10.1	19.2
	RM200	48	11.3	11.3	30.5
	RM250	28	6.6	6.6	37.1
	RM300	38	8.9	8.9	46.0
	RM350	27	6.3	6.3	52.3
	RM400	25	5.9	5.9	58.2
	RM450	18	4.2	4.2	62.4
	RM500	54	12.7	12.7	75.1
	RM550	10	2.3	2.3	77.5
	RM600	28	6.6	6.6	84.0
	RM650	1	.2	.2	84.3
	RM700	7	1.6	1.6	85.9
	RM750	3	.7	.7	86.6
	RM800	8	1.9	1.9	88.5
	RM900	1	.2	.2	88.7
	RM950	3	.7	.7	89.4
	RM1000 & above	45	10.6	10.6	100.0
	Total	426	100.0	100.0	

Weekly frequency of M-payment usage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 - 3 times per month	38	8.9	8.9	8.9
	1 - 2 times per week	33	7.7	7.7	16.7
	3 - 4 times per week	120	28.2	28.2	44.8
	5 - 6 times per week	53	12.4	12.4	57.3
	7 - 8 times per week	58	13.6	13.6	70.9
	9 - 10 times per week	45	10.6	10.6	81.5
	11 - 12 times per week	12	2.8	2.8	84.3

	13 times and above per week	67	15.7	15.7	100.0
	Total	426	100.0	100.0	

Monthly retail expenditure via the selected M-payment app

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	RM1-RM49	77	18.1	18.1	18.1
	RM50-RM99	78	18.3	18.3	36.4
	RM100-RM149	60	14.1	14.1	50.5
	RM150-RM199	54	12.7	12.7	63.1
	RM200-RM249	51	12.0	12.0	75.1
	RM250-RM499	71	16.7	16.7	91.8
	RM500-RM999	26	6.1	6.1	97.9
	RM1000 and above	9	2.1	2.1	100.0
	Total	426	100.0	100.0	

Experience using the M-payment service

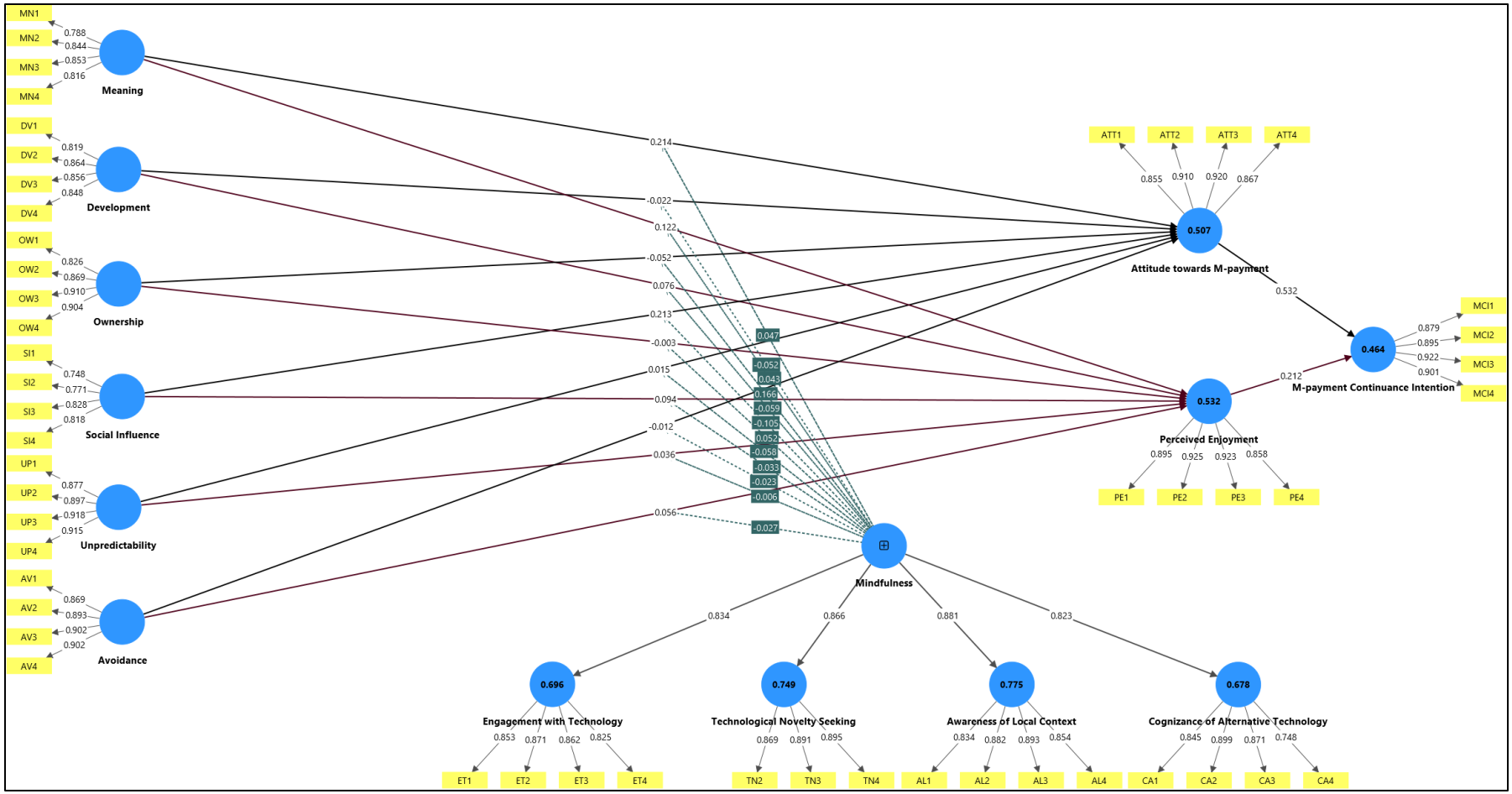
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 - 3 months	17	4.0	4.0	4.0
	4 - 6 months	20	4.7	4.7	8.7
	6 - 9 months	13	3.1	3.1	11.7
	10 - 12 months	13	3.1	3.1	14.8
	1 year	63	14.8	14.8	29.6
	2 years	165	38.7	38.7	68.3
	3 years and above	135	31.7	31.7	100.0
	Total	426	100.0	100.0	

APPENDIX 8
Result of Harman's One Factor Test

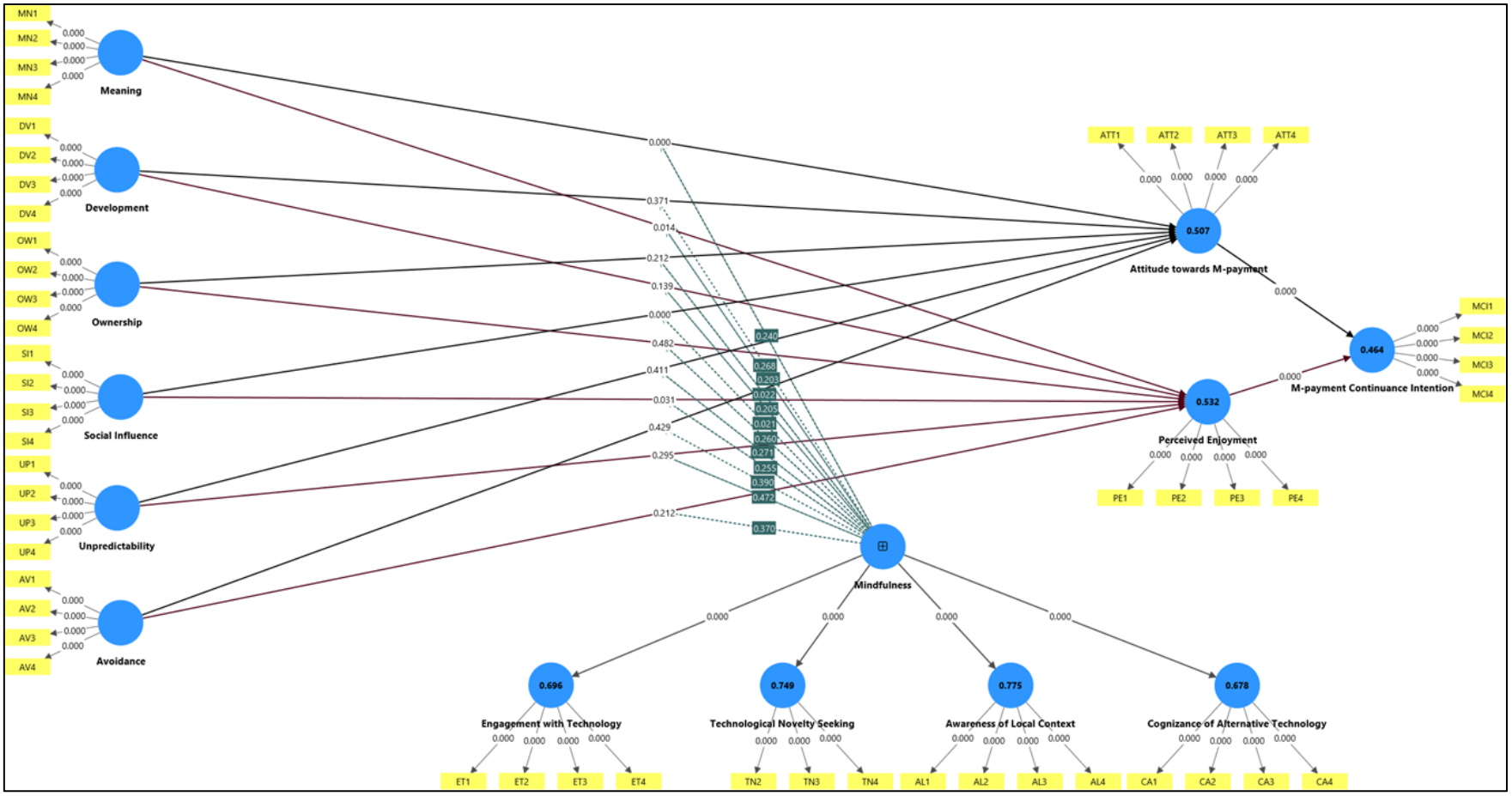
Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	21.911	42.137	42.137	21.911	42.137	42.137
2	4.156	7.992	50.128			
3	2.156	4.146	54.275			
4	1.897	3.648	57.922			
5	1.612	3.100	61.023			
6	1.351	2.598	63.621			
7	1.330	2.558	66.179			
8	1.225	2.357	68.536			
9	1.215	2.337	70.873			
10	.969	1.863	72.736			
11	.878	1.689	74.425			
12	.852	1.639	76.064			
13	.740	1.423	77.488			
14	.738	1.419	78.907			
15	.652	1.254	80.161			
16	.634	1.219	81.380			
17	.564	1.084	82.464			
18	.518	.996	83.460			
19	.476	.914	84.374			
20	.470	.903	85.278			
21	.435	.837	86.115			
22	.407	.782	86.897			
23	.383	.736	87.633			
24	.374	.719	88.352			
25	.367	.706	89.057			
26	.347	.668	89.725			
27	.337	.649	90.374			
28	.321	.617	90.990			
29	.311	.597	91.588			
30	.298	.573	92.160			
31	.290	.559	92.719			
32	.274	.526	93.245			

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
33	.267	.514	93.759			
34	.263	.506	94.265			
35	.249	.479	94.744			
36	.239	.459	95.203			
37	.216	.415	95.618			
38	.210	.403	96.022			
39	.204	.393	96.414			
40	.196	.377	96.791			
41	.188	.361	97.151			
42	.183	.351	97.503			
43	.179	.344	97.847			
44	.160	.307	98.154			
45	.153	.293	98.447			
46	.148	.284	98.732			
47	.133	.256	98.988			
48	.125	.240	99.228			
49	.117	.226	99.454			
50	.102	.197	99.651			
51	.096	.184	99.835			
52	.086	.165	100.000			
Extraction Method: Principal Component Analysis.						

APPENDIX 9
Measurement Model of this Research



APPENDIX 10
Structural Model of this Research



AUTHOR'S PROFILE



Faten Aisyah binti Ahmad Ramli received her early education at Sekolah Menengah Kebangsaan Lembah Bidong, Terengganu. She pursued her Diploma in Business Studies at Universiti Teknologi MARA (UiTM), Shah Alam, Selangor, and graduated in 2016. She subsequently obtained a Bachelor of Business Administration (Hons.) in Marketing from UiTM Kota Bharu, Kelantan, in 2018, graduating with First Class Honours. In the same year, she enrolled in the Master of Science (Business Management) programme at UiTM Shah Alam, Selangor, which she completed by research in 2021. Her master's thesis focused on digital payment adoption in Malaysia, with particular emphasis on close-proximity digital wallet usage. She commenced her Doctor of Philosophy (Business Management) at UiTM Shah Alam in 2022. Her doctoral research examines the prediction of mobile payment continuance intention through gamification mechanisms, with mindfulness serving as a moderating construct. Her academic interests and research domains include marketing, digital marketing, consumer behaviour, and mobile payment acceptance. In addition to her academic pursuits, she has accumulated diverse professional experience. She managed and expanded an online business on the Shopee platform from 2018 to 2022 and previously supported operational analytics as a TMElite at TMFA Region Timur. Afterwards, she started her career as a lecturer at UiTM Kelantan, where she teaches at the pre-diploma, diploma, and degree levels, and actively contributes to teaching development, assessment design, and student engagement initiatives.

LIST OF PUBLICATIONS

Ahmad Ramli, F. A., Hamzah, M. I., & Ahmad Yatim-Mustafa, N. A. (2026). Investigating QR mobile payment adoption in Malaysia: A diffusion of innovation perspective. Journal of Emerging Economies and Islamic Research, 14(2), 9999. https://doi.org/10.24191/jeeir.v14i2.9999

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