Determining drivers of Muslim consumers' intention to use mobile commerce in Malaysia

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Abstract: Mobile commerce has rapidly developed in the last few years. However, Muslim consumers' widespread acceptance of its transactions in Malaysia poses a significant obstacle for m-commerce suppliers. This paper proposes to examine the factors impacting mobile commerce use in Malaysia. Convenience sampling was employed to integrate TAM and TPB, and 350 surveys were collected online from customers residing in Selangor, Malaysia. The current study employed a two-stage structural equation modelling approaches to investigate the research model and evaluate the hypotheses. The results show that perceived usefulness, subjective norms, and perceived ease of use significantly predict Muslim consumers' intention to adopt m-commerce in Malaysia. In contrast, attitude and perceived behavioural control do not significantly predict their intention to use m-commerce. Hence, the findings of this paper offer significant advantages for m-commerce providers in Malaysia; it is also advantageous for academics, marketers, policymakers, practitioners, and all stakeholders of the industry.

Keywords: mobile commerce; m-commerce; intention; Muslim; Malaysia; technology acceptance model; TAM; theory of planned behaviour; TPB.

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1 Introduction

The rapid advancement of technology has drastically transformed our lives, enabling people to stay well-informed and engage in strategic business activities. New technologies have facilitated greater interaction between consumers and businesses (Marinova et al., 2017). One area that has garnered significant attention is the global rise of mobile commerce (m-commerce) platforms, which have witnessed substantial growth in recent years (Barry et al., 2024a). Despite the potential for future growth, the factors driving m-commerce adoption in developing economies remain underexplored (Lavuri et al., 2023).

However, smartphone usage has significantly enhanced online businesses (Sarkar et al., 2020), allowing businesses to revolutionise their interactions with customers. M-commerce refers to using wireless devices like smartphones and PDAs, connected to a network, to access information and conduct transactions (Barry et al., 2024b). This increasing reliance on mobile devices has impacted conventional business practices. Wireless telecommunications have emerged as a critical means of improving traditional infrastructure using standardised technologies (Nokia et al., 2023; Jain et al., 2021).

M-commerce encompasses a variety of activities, including mobile payments, transactions, and the development of mobile applications to share information about products (Borambayeva et al., 2023; Gaghana and Sutomo, 2023). Its adoption is driven by convenience, extensive accessibility, and social interaction (Lee et al., 2023). However, challenges remain, such as the obstacles Islamic banks face in mobile banking (Yazid et al., 2023). Smartphones are pivotal in m-commerce adoption and need further investigation (Gilstrap and Gilstrap, 2023).

Nevertheless, the Gallera mobile application, developed in 2023, aims to provide users with a convenient way to order meals. Yazid et al. (2023) introduced a customisable and adaptable usability model for m-commerce applications, highlighting their versatility and potential. Meanwhile, Lee et al. (2023) examined factors that influence consumer trust in mobile shopping applications and purchase intentions, identifying user familiarity, online reviews, and app design as key drivers.

According to the World Bank, global mobile phone users are projected to exceed 8.27 billion, with over 6.5 billion people using smartphones. This figure is expected to rise substantially in the coming years (Statista, 2022). Additionally, the International Telecommunications Union (ITU) reported that 4.9 billion people, or 63% of the global population, used the internet in 2021, up from 16% in 2005 (ITU Statistics, 2022). By April 2022, global internet usage reached 5 billion, with 4.65 billion social media users (Statista, 2022). Malaysia has seen a marked increase in Internet and smartphone usage over the past few decades (Barry et al., 2024a). However, despite the widespread use of

smartphones and the internet, m-commerce adoption in Malaysia remains relatively low compared to e-commerce (Yahaya et al., 2022; Barry et al., 2024a).

This research has important implications for professionals, scholars, and m-commerce providers seeking to understand the viewpoints of Muslim users and promote m-commerce services in emerging nations. By examining the relationships between subjective norms, perceived usefulness (PU), attitudes, ease of use, and perceived behavioural control, the study sheds light on the drivers of Muslim users' intention to use m-commerce in Malaysia. Identifying these determinants can guide m-commerce providers in making informed investments to create a robust m-commerce ecosystem targeting Muslim users. This study is also essential for marketers and policymakers, aligning with Bank Negara's goal of moving towards a cashless society. Therefore, the research questions of this paper include:

What is the effect of attitude, subjective norms, perceived behavioural control, perceived ease of use (PEOU), and PU on intention? What is the effect of PEOU on PU? What is the mediating effect of PU in the relationship between PEOU and intention?

2 Theoretical underpinning

2.1 Technology acceptance model

Several theories have been put up to understand customers' intention to use information systems technology. The primary goal of the technology acceptance model (TAM) is to forecast IT usage, it also explores the usage of computer technology by end-users from different demographic groups (Davis, 1989). The TAM is used to study how people come to accept and use new technologies (Barry and Jan, 2018). It suggests that adoption of technology is influenced by two key factors: PU: The extent to which an individual thinks that utilising technology would improve their output or performance at work. The degree to which a person thinks utilising a technology would be effortless is known as PEOU (Davis, 1989). As per TAM, users are more inclined to accept and use a technology if they believe it to be easy to use and beneficial. By concentrating on these important views, the model aids in predicting user acceptability and provides guidance for the design and application of technology (Davis, 1989). Hence, this study explored factors impacting customers' intention to use m-commerce in Malaysia.

TAM has been widely used in various areas, such as m-commerce, QR code payment, mobile payment, online learning platforms, mobile shopping, mobile banking, FinTech adoption, government IT governance, electronic money, and electronic commerce. Research continually demonstrates that individuals' views of the usability and utility of technology significantly impact their attitudes and behaviours toward its actual usage. Several factors impact technology adoption, including PEOU, PU, subjective norms, perceived interest, perceived pleasure, or pricing etc.

2.2 Theory of planned behaviour

A psychological theory known as the theory of planned behaviour (TPB) describes how personal intentions impact behaviours. To better account for variables outside of an individual's control. The TPB asserts that: Behavioural Intentions refers to a person's intention to engage in an action or not is what drives these most direct determinants of

behaviour. The person's attitude toward the conduct is their assessment of it, whether it be favourable or unfavourable. Subjective norms refers to beliefs about what other people believe one should do that lead to a perception of social pressure to engage in a behaviour or refrain from engaging in it. Perceived behavioural control refers to the person's estimation of the behaviour's ease of execution or difficulty, taking obstacles and available resources into account (Ajzen, 1991). Hence, the TPB holds that an individual's intentions, which are moulded by their attitudes, subjective norms, and perceived behavioural control over their actions, have an impact on their behaviour. This approach aids in the comprehension and forecasting of behavioural intentions in diverse settings.

Additionally, the TPB suggests that one's intentions to employ a specific behaviour are mainly persuaded by one's attitude towards behaviour, the subjective norms related to the behaviour, and the perception of control over it. These factors are crucial in determining planned behaviours (Ajzen, 1991). Developing TPB aims to improve the accuracy of predicting outcomes based on TRA. Ajzen (1991) suggested adding perceived behavioural control to the TPB. Perceived behaviour control was not incorporated as a TRA model. TPB has been employed to analyse the relationships between concepts, attitudes, intentions, and actions in several domains of human behaviour. However, previous studies have tried integrating TAM and TPB to identify the drivers of m-commerce (Hasan et al., 2024; Bano and Siddiqui, 2024; Yildirim and Ayar, 2024; Sasidharan and Venkatakrishnan, 2024; Ibrahim et al., 2024).

Hence, this research will combine these two theories to explore drivers of m-commerce among Malaysian Muslim consumers. The exogenous variables in this study are attitude, PU, subjective norms, PEOU, and perceived behavioural control. The endogenous variable is the intention to use m-commerce. The subsequent section broadly discusses the exogenous variables and their correlation with the endogenous variable, drawing upon research conducted by prior studies.

3 Literature review

3.1 M-commerce

M-commerce, often known as m-commerce, is an advancement of online shopping that enables consumers to cooperate with other consumers or businesses using wireless technology without being limited by time or location (Mollick et al., 2023). Cellular telecommunications networks enable direct and indirect transactions (Jin and Youn, 2022). M-commerce, as defined by Alkailani and Nusairat (2022), encompasses any transaction that occurs through a mobile device and wireless telecommunications involving the exchange of economic value.

Additionally, Ramana et al. (2022) viewed m-commerce as any financial operation using a wireless device. Mobile phones, tablets, and laptops are commonly utilised devices for m-commerce (Barry et al., 2024b). M-commerce, as described by Abdelkarim and Nasereddin (2010), is the process of using electronic devices to transfer ownership of items. It refers to transacting goods and services via a portable device (Mehedintu and Soava, 2022). However, Taneja (2021) opines that a portable handheld device is used to perform mobile electronic commerce transactions called m-commerce.

M-commerce has witnessed substantial expansion, particularly in examining consumers' behaviour and its impact on sales (Jain and Tan, 2022). Balagué and Zhao

(2021) examined how mobile social commerce has replaced online social business. El-Ebiary et al. (2021) investigated the potential advantages and obstacles linked to platforms such as Foodpanda. Generation Z is highly inclined toward embracing m-commerce, with a specific preference for mobile apps (Puiu et al., 2022). According to Văzaru and Bocean (2021), the COVID-19 pandemic has expedited the expansion of m-commerce, particularly emphasising enhancing the speed of the internet. Williams (2021) highlighted the importance of convenience, utility, and innovation.

3.2 Intention

Multiple factors impact the propensity to accept m-commerce. The primary attributes of m-commerce that improve the probability of purchase include convenience, extensive accessibility, and social engagement (Lee et al., 2023). Satisfaction, subjective norms, simplicity of use, and usefulness are key elements affecting the intention to use m-payment systems (Ankadhitra et al., 2023). The critical determinants of continuous intention in mobile payment platforms in emerging economies include performance expectancy, social influence, effort expectancy, conducive circumstances, intrinsic motivation, price value, and prior experience (Nwosu and Ike-Elechi, 2023). Gunawan et al. (2023) discovered that social and peer influence substantially impacted the inclination to make purchases in electronic commerce.

Furthermore, social influence, trust, and happiness are vital in effectively adopting m-payment systems (Ifada and Abidin, 2023). Performance expectancy, effort expectancy, conducive environment, perceived trust, and digital financial literacy significantly influence the intention of street sellers to accept m-payment systems (Nandru et al., 2023). The level of involvement in e-WOM communication on WeChat is affected by functional, hedonic, and social factors, which subsequently contribute to the inclination to participate in such communication (Pang and Wang, 2023). Ankadhitra et al. (2023) found that individuals' inclination to use mobile food delivery services is influenced by their innovativeness, trust, ease of use, and perceived value.

When a consumer's interest is impacted by their intentions it becomes evident and directs it to a specific objective. Intention is typically associated with an individual's involvement in an activity, which is impacted by their belief in an object. In 1989, Davis labelled intention as the individual's probability of adopting a specific behaviour. An individual's intention affects their utilisation of technology, precisely their inclination to embrace and sustain it (Venkatesh et al., 2012).

The phrase intention to use m-commerce pertains to the probability of customers accepting the novelty (Vinerean et al., 2022). It is the probability that consumers will participate in online transactions via m-commerce (Wu and Wang, 2005). In this study, the researchers agree that intention to use m-commerce refers to the probability of users participating in electronic purchases via a smartphone.

On the one hand, Barry et al. (2024a) revealed that information quality, system quality, and service quality are the factors predicting the intention to use m-commerce. On the other hands, Barry and Jan (2016) revealed that PU, PEOU, privacy and security, and perceived enjoyment are the factors driving social networking users to use m-commerce in Malaysia.

3.3 Attitude

TPB delineates the precise connection between beliefs and attitudes. According to this notion, an individual's assessment or viewpoint of behaviour is influenced by their readily available views. In this theory, belief pertains to the individual's subjective probability of behaviour resulting in a specific outcome (Ajzen, 1991). Several researchers have found that attitude positively influences the intention to use m-commerce. Yasin et al. (2024) found that attitude and intention are significantly related. Similarly, Sutrisno (2023) revealed that attitude strongly predicts intention. Abdullah et al. (2024) identified attitude and ease of use as strongly predicting intention. Additionally, Wijaya (2024) revealed attitude and usefulness to influence intention significantly. These studies prove that attitude and other factors can significantly affect the intention to use m-commerce among consumers in Malaysia.

Furthermore, a study by Ahmed and Barry (2023) revealed a significant link between attitude and behavioural intention. Barry and Jan (2018) also discovered that attitude is significantly associated with intention among young customers in Malaysia. However, Barry and Jan (2016) proposed a direct positive link between attitude and intention. Barry (2024b) and Barry et al. (2024c) also revealed a significant relationship between attitude and the intention to use m-commerce. Therefore, based on these studies, the researchers proposed the subsequent:

H1 Attitude positively affects Muslim consumers' intention.

3.4 Subjective norms

Subjective norm is the influence of peers on an individual's decision to execute a specific behaviour (Ajzen, 1991). However, several researchers have examined how subjective norms influence the intention to engage in m-commerce. In their study, Yasin et al. (2024) encountered that subjective norms significantly influence the intention of young adults in Malaysia to utilise mobile health applications. Restianto et al. (2024) found a direct link between subjective norms and intention. This correlation is influenced by user happiness, which acts as a mediator. Marpaung et al. (2024) discovered a significant correlation between subjective norms and customer satisfaction, subsequently affecting intention. Abdullah et al. (2024) discovered that subjective norms had a minor impact on mobile payment adoption among adults of working age in Malaysia. Barry (2024b) and Barry et al. (2024c) also discovered a significant relationship between subjective norms and the intention to use m-commerce. Therefore, the researchers propose the following:

H2 Subjective norm positively affects Muslim consumers' intention.

3.5 Perceived behavioural control

Perceived behavioural control refers to an individual's perceived ease or difficulty associated with a specific behaviour (Ajzen, 1991). Many scholars found a positive link between perceived behavioural control and intention. Abdullah et al. (2024) found that perceived behavioural control strongly impacts the intention to use mobile payments. Restianto et al. (2024) also discovered that perceived behavioural control is significantly associated with intention. Similarly, Yasin et al. (2024) revealed that perceived

behavioural control significantly predicts intention. Allahham and Ahmad (2024) also found that perceived behavioural control significantly affects the intention to use artificial intelligence. Barry (2024b) and Barry et al. (2024c) also revealed that perceived behavioural control significantly predicts the intention to use m-commerce in Malaysia. Therefore, based on these findings, the researchers proposed the following:

H3 Perceived behavioural control positively affects Muslim consumers' intention.

3.6 Perceived ease of use

PEOU is when a consumer thinks using m-commerce is free of effort (Davis, 1989). However, scholars found PEOU and usefulness to be strong predictors of intention to use m-commerce in Malaysia. Asastani et al. (2018) revealed that ease of use significantly affects intention. Earlier in 1989, Davis discovered the same result. Similarly, Basuki et al. (2022) found that PEOU substantially links with intention. Additionally, Zuniarti et al. (2021) also discovered that intention is strongly predicted by PEOU. However, Chan et al. (2022), Anifa and Sanaji (2022), Susanti and Alamsyah (2022), Ferdianto (2022), Widiar et al. (2023) and Lee et al. (2023) found similar results. Indicating that PEOU substantially influences intention, Barry (2024a), Barry and Haque (2024) and Barry et al. (2024d) also found PEOU significantly predicts the intention to use m-commerce among Malaysia users. Therefore, based on these studies, the researchers propose the following:

H4 PEOU positively affects Muslim consumers' intention.

H5 PEOU positively affects PU.

3.7 Perceived usefulness

TAM suggests that the perceived usability of a technology directly impacts its perceived value. These impressions are additionally shaped by extrinsic variables such as confidence in the system, environmental support, social impact, gender, and age. The main factor is the PU. Davis (1989) found that the PU of something had a more significant impact on behaviour changes than the perceived simplicity of use. People mostly use technology for their functionality rather than relaxation (Davis, 1989). PU refers to an individual's evaluation of how much a feature technology will enhance job execution (Davis, 1989).

Various academics have continuously shown a strong and straightforward connection between PU and inclination. PU is positively associated with the intention to engage in mobile purchasing (Chan et al., 2022). Ferdianto (2022) showed that PU is positively linked with intention. Anifa and Sanaji (2022) found that PU is a strong predictor of intention. Similarly, Widiar et al. (2023) discovered that PU positively influenced intention. Lee et al. (2023) revealed that usefulness has a significant link with the intention to use m-commerce. Ligaraba et al. (2023) found that the PU of a product influences people's intentions to purchase it and use it again.

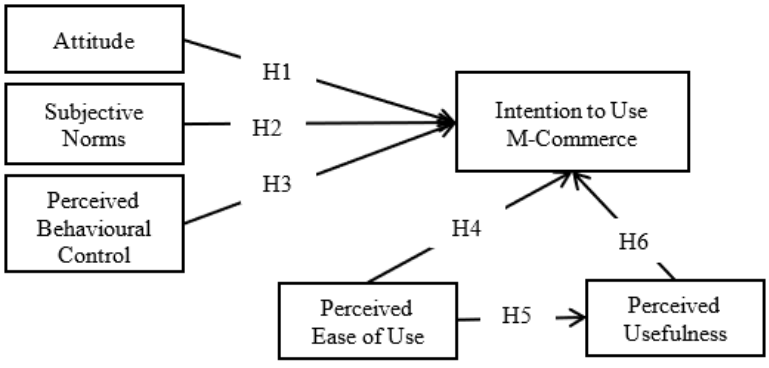
Additionally, Susanti and Alamsyah (2022) found that PU is the strongest predictor of intention. Yu and Huang (2022) studied the relationship between the PU of m-payment and mobile gaming on commerce platforms. They identified a direct association. Barry (2024a), Barry and Haque (2024) and Barry et al. (2024d) found similar results indicating

a significant relationship between PEOU and intention to use m-commerce among Malaysia users. Consequently, the researchers proposed the following:

H6 PU positively affects Muslim consumers' intention.

H7 PU mediates between PEOU and Muslim consumers' intention.

Figure 1 Conceptual framework



4 Research methodology

4.1 Sampling and data collection

This study used a quantitative research approach in collecting data from people residing in Selangor who are 18 years and above and possess smartphones, selected by the convenient sample approach. It focuses on surveying people in Selangor, with a particular emphasis on the high number of people who are 18 and above, own smartphones, and conduct m-commerce (Barry et al., 2024a).

Data was gathered using survey questionnaires distributed online in January 2024 via a Google form. The link to the survey's form, accompanied by a description clarifying the purpose of the study, was sent to the intended respondents via various social media platforms, including Facebook, Instagram, TikTok, and WhatsApp. The selection of these platforms was based on their extensive adoption in Malaysia. The hyperlink was available to the target demographic for three months, enabling participants to appropriately complete the questionnaire by clicking the provided link or scanning the QR code. Respondents had the option to participate in the poll voluntarily. Following a three-month data collection period, duplicate or erroneous answers were eliminated to maintain the integrity of the dataset. 380 questionnaires were collected, generating 350 usable responses from diverse smartphone users.

4.2 Research instruments

The questionnaire employed in this research is categorised into two sections: section A and section B. Section A of the questionnaire sought to collect demographic information from the participants. Section B includes five variables that impact Muslim consumers'

intention to use m-commerce. These components include PU, attitude, PEOU, subjective norms, and perceived behavioural control. The survey instrument consisted of 31 items. A five-point Likert scale was employed to evaluate the degree of agreement or disagreement with each topic, ranging from 1-strongly disagree to 5-strongly agree. The participants were provided with information regarding the study's objectives and were instructed to complete the survey only if they were familiar with or had utilised an m-commerce system. Voluntary participation was required, and meticulous attention was given to gathering and analysing the data. After analysing the filled-up surveys, the data was examined to determine if it followed a normal distribution. When conducting data analysis using factor analysis, it is necessary to test for multicollinearity, homoscedasticity, and linearity assumptions.

5 Results and discussion

5.1 Demographic profiles of the respondents

The demographic profiles of the participants are displayed in Table 1. The table shows that 50.9 % (178) are males, while the female responses were 49.1% (172). Most respondents are Malaysians (74.9%) aged between 24 and 29 (31.1%). In addition, most of the respondents are single (67.4%) and have a bachelor's degree (52.6%).

Table 1 Demographic characteristics of the respondents

Demographic variables		*Research sample (n = 350)*	
		Frequency	*Percentage (%)*
Gender	Male	178	50.9
	Female	172	49.1
Age	18–23	91	26.0
	24–29	109	31.1
	30–35	65	18.6
	36–41	49	14.0
	42–above	36	10.3
Nationality	Malaysian	262	74.9
	Non-Malaysian	88	25.1
Marital status	Single	236	67.4
	Married	114	32.6
Level of education	Diploma	21	6.0
	Bachelor	184	52.6
	Master	97	27.7
	PhD	48	13.7

Source: Author's computation

5.2 Reliability test

The data distribution exhibits a range of skewness values, ranging from –1.656 to +0.143. Similarly, the kurtosis values range from –1.347 to 4.645. Given that the skewness and kurtosis coefficients are below ±3 and ±10, the entire dataset may be inferred to follow a normal distribution (Kline, 2011). Table 2 displays the findings of the reliability test. The variables tested in the study showed Cronbach's alpha values vary between 0.843 and 0.904. All variables obtained a score beyond 0.60, indicating their reliability (Hair et al., 2010).

Table 2 Reliability analysis

Constructs	*Cronbach's α*	*Number of items*
Attitude	0.843	4
Subjective norms	0.851	4
Perceived behavioural control	0.863	6
Perceived ease of use	0.904	7
Perceived usefulness	0.871	6
Intention	0.848	4

Source: Author's computation

5.3 Factor analysis

Factor analysis refers to a statistical method employed to identify and understand a study's underlying structure of variables. Factor analysis is a statistical technique that simplifies many items into a smaller set of essential factors that include all the variables. The variable structure is assessed and analysed in a specific context using reliable tests, such as factor analysis, to verify if each construct shares a similar underlying concept. Therefore, the example elucidates the correlation between variables. This study utilises the KMO measure of sampling adequacy to produce components and evaluate the authenticity of the items. Kaiser (1974) suggests a minimal criterion of 0.5. The findings are average if they fall between 0.5 and 0.7, acceptable from 0.7 to 0.8, excellent from 0.8 to 0.9, and outstanding if they exceed 0.9. The KMO result obtained in the study is exceptionally high (0.915), as indicated in Table 4.

The current research applies a data-reduction technique to limit the number of items utilised in this investigation. Consequently, factor analysis is utilised to reduce the number of items to a smaller group of fundamental elements while minimising the loss of information. In this study, the factor loading for the rotation matrix is regarded as critical and fixed at 0.5. Any score below this threshold is deemed unimportant and should be excluded from the analysis (Hair et al., 2010). The result indicates that all items had values higher than 0.5, suggesting that all variables are significant. Additionally, the Eigenvalue results indicate that the survey questions were strongly associated with seven distinct factors, collectively explaining 67.743% of the total variance.

5.4 KMO and Bartlett's test of sphericity

The KMO and Bartlett's test were employed to evaluate the scales' unidimensionality level (see Table 3). The results specify that the KMO value is 0.915, within the recommended threshold range of 0 to 1, as Field (2009) suggested. The p-value for the sphericity tests is below 0.001, showing statistical implication. Thus, the factor analysis encounters the condition.

Table 3 KMO and Bartlett's tests

KMO sampling adequacy measurement		0.915
Sphericity test	Approx. Chi-square	6,791.371
	Degree of freedom	435
	Significance	0.000

Source: Author's computation

5.5 Convergent and discriminant validity

The composite reliability (CR) and average variance extracted (AVE) were used to assess the reliability, convergent validity, and discriminant validity. It is advised that the CR should exceed 0.7, and the AVE should be higher than 0.5 to demonstrate substantial dependability (Hair et al., 2010). The CR should be greater than the AVE to establish convergent validity. Furthermore, the combined AVE of the variables should be greater than the correlation value to demonstrate discriminant validity. The results from Table 4 demonstrate that the AVE for each construct was greater than 0.501, while the CR exceeded 0.816. This suggests that the structures were sufficiently reliable and precise. Moreover, all the structures displayed indicate acceptable discriminant validity, as indicated by the square root of the AVE being more significant than their correlation coefficients (see Table 4).

Table 4 Convergent and discriminant validity

	CR	*AVE*	*MSV*	*ASV*	*SN*	*PEU*	*ATT*	*INT*	*PU*	*PBC*
PE	0.860	0.677	0.416	0.249	*0.823*					
SN	0.906	0.580	0.490	0.375	0.474	*0.762*				
PEU	0.856	0.613	0.468	0.347	0.557	0.638	*0.783*			
ATT	0.817	0.528	0.416	0.338	0.645	0.640	0.574	*0.727*		
PU	0.832	0.502	0.490	0.352	0.409	0.700	0.684	0.586	*0.708*	
PBC	0.868	0.525	0.343	0.234	0.356	0.586	0.470	0.436	0.539	*0.724*

Source: Author's computation

5.6 Structural equation model (SEM)

The study model was analysed using SPSS AMOS 24. The adequacy of the model's fit was evaluated by employing five SEM fit indices. The results show that the fit indices do not meet the requirement. Therefore, a few modifications were needed to meet this requirement. However, based on the modification indices, the item PU1 was deleted due to a low factor loading (0.41), and some items are correlated INT1-INT2, INT3-INT4,

PU2-PU3, PU2-PU5, PU4-PU5, and PU5-PU6. After modification of the model, the results show that the chi-square is 917.162, and the normed chi-square is 2.555. GFI, CFI, IFI, and TLI are 0.910, 0.913, 0.914, and 0.908, respectively, indicating that all values exceed the threshold value of 0.90. RMSEA is 0.067 lower than the threshold of 0.08. Therefore, the model matched the data well, as all goodness of fit indices fell within the permissible limits (Bentler and Bonett, 1980).

5.7 Hypothesis testing

Table 5 presents the findings of the hypotheses testing. Figure 2 shows the features of the causal routes, consisting of the standardised path coefficients.

Figure 2 Hypothesised drivers of m-commerce in Malaysia (see online version for colours)

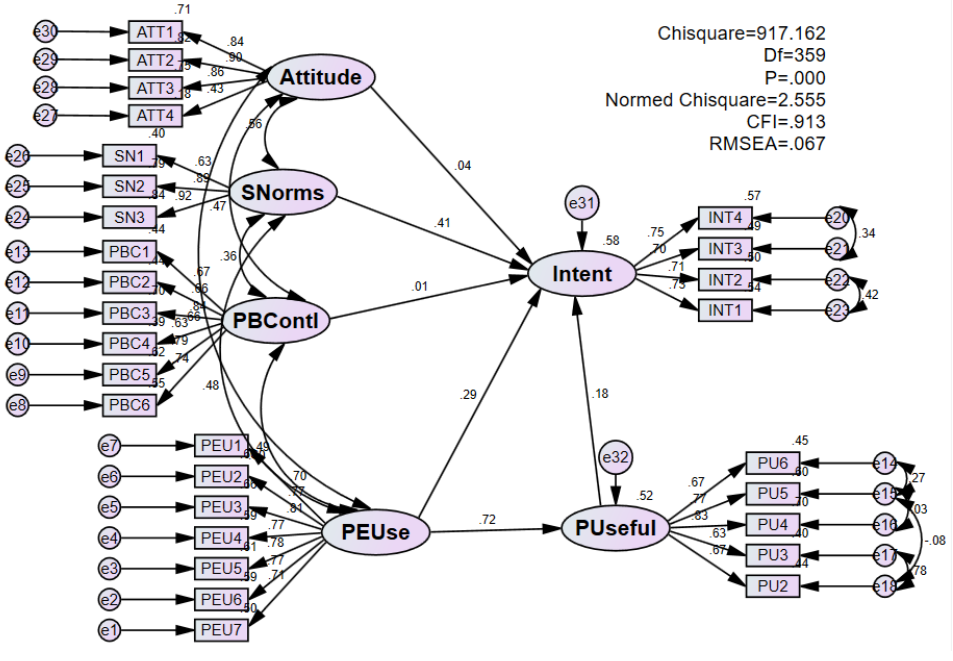


Table 5 Hypotheses testing and results

H	*Paths*	*Coeff (β)*	*Critical ratio*	*Sig*	*Result*
H1	Attitude ---> Intention	0.037	0.475	0.635	Not supported
H2	Subj. norms ---> Intention	0.413	5.922	0.000	Supported
H3	PB control ---> Intention	0.008	0.123	0.902	Not supported
H4	PE use ---> Intention	0.294	2.964	0.003	Supported
H5	PE use ---> P useful	0.719	9.393	0.000	Supported
H6	P useful ---> Intention	0.179	2.007	0.045	Supported

5.8 Mediation

This study tested usefulness as a mediating variable between PEOU and the intention to use m-commerce among Muslim consumers in Malaysia. The results from 2,000 samples of bootstrapping and 95% confidence interval analysis indicate no mediation effect ($\beta = 0.131$, $p = 0.117$). According to Table 6, usefulness does not mediate the link between ease of use and intention. However, this result is supported by Widiar et al. (2023). In contrast, the result contradicts Andavara et al. (2021).

Table 6 Mediation effect of PU

Path	*Total effect*		*Direct effect*		*Indirect effect*		*Results*
	Coeff (β)	*Sig*	*Coeff (β)*	*Sig*	*Coeff (β)*	*Sig*	
PEU->PU->INT	0.043	0.010	0.299	0.024	0.131	0.117	No mediation

Source: Author's computation

5.9 Results of the hypothesis testing

As shown in Table 6 above, four regression coefficient paths out of the six proposed in the conceptual model were statistically significant. Assessment of the path revealed that attitude has no significant effect on intention ($\beta = 0.037$, $p = 0.635$) providing no support for Hypothesis 1. This result contradicts Abdullah et al. (2024) and aligns with Marpaung et al. (2024). There was a statistically significant relationship between subjective norms and intention ($\beta = 0.413$, $p < 0.001$) providing support for Hypothesis 2. There was no statistical significance relationship between perceived behavioural control and intention ($\beta = 0.008$, $p < 0.902$) contradicting Hypothesis 3. However, PEOU ($\beta = 0.294$, $p = 0.003$) and PU ($\beta = 0.179$, $p = 0.045$) significantly predict intention to use m-commerce, providing support to Hypotheses 4 and 6, respectively. Moreover, PEOU ($\beta = 0.719$, $p < 0.001$) significantly predicts PU, proving support for Hypothesis 5. In addition, the mediation regression coefficient path results ($\beta = 0.131$, $p = 0.117$) as illustrated in Table 7 indicates that PU does not mediates the relationship between PEOU and intention, providing no support for Hypothesis 7.

6 Theoretical contribution

The purpose of this study was to integrate the TAM and TPB in the context of m-commerce adoption intention among Muslim consumers in Malaysia. The results challenge some of the basic assumptions of the TPB. As attitude and perceived behavioural control show no significant effect on the Muslim consumers' intention to use m-commerce in Malaysia.

This research ascertained that subjective norms have a significant effect on the Muslim consumers' intention to use m-commerce. Hypothesis 2 result indicates that subjective norms positively impact the intention to utilise m-commerce. Nevertheless, the positive impact of subjective norms on the Muslim consumers' intention to utilise m-commerce is statistically and practically significant. Hypothesis 2 is therefore

supported. This result is confirmed by Yasin et al. (2024) who revealed that subjective norms strongly predict intention. Ahmed and Barry (2023) and Barry et al. (2024a, 2024b, 2024c, 2024d) also found subjective norms were a significant determinant of intention. Additionally, Restianto et al. (2024) witnessed that subjective norms and intention have a positive and significant relationship. Marpaung et al. (2024) revealed that subjective norms were a strong predictor of intention through satisfaction. Thus, all these scholars found a substantial positive relationship between subjective norms and intention. In contrast, Abdullah et al (2024) revealed a minor relationship between subjective norms and mobile payment adoption among adults of working age in Malaysia.

As shown in Table 6, perceived behavioural control has no statistical significance on the Muslim consumers' intention to use m-commerce in Malaysia. However, this relationship is statistically and practically insignificant providing no support to Hypothesis 3. However, this finding contradicts Restianto et al. (2024) who revealed a significant relationship between perceived behavioural control and intention. Allahham and Ahmad (2024) also found that perceived behavioural control is a strong predictor of intention. Ahmed and Barry (2023) and Barry et al. (2024a, 2024b, 2024c, 2024d) found that perceived behavioural control and intention have a significant positive relationship. Thus, all these studies revealed a substantial positive link between perceived behavioural control and intention. In contrast, the finding aligns with Zhang (2024), who observed no substantial correlation between perceived behavioural control and intention.

This study also investigated the effect of PU and PEOU on Muslim consumers' intention to use m-commerce in Malaysia. The results indicate that PEOU and PU are pertinent in predicting the intention to use m-commerce supporting Hypotheses 4 and 6. This finding aligns with the findings of Barry et al. (2024b) who revealed a significant relationship between PEOU and intention to use m-commerce. Users may simply have a positive and favourable intention to use m-commerce if they find it easy to use (Widiar et al., 2023). Consumers will only use m-commerce if they find it useful and easy to use (Susanti and Alamsyah, 2022). PEOU and PU are the strongest predictors of intention to use m-commerce (Ferdianto, 2022).

Additionally, Chan et al. (2022) found that PU and intention are significantly related. Barry and Jan (2018) also found that perceived ease of and PU significantly predict the intention to use m-commerce. This finding is also supported by Barry and Jan (2016) and Barry et al. (2024c). Therefore, it is evident that the more m-commerce is useful and easy to use the more Muslim consumers will have a positive and favourable intention to use it. In contrast, the finding contradicts Barry et al. (2024a) who revealed that PEOU and PU have no significant effect on the intention to use m-commerce. Restianto et al. (2024) also discovered that PEOU and PU do not predict the intention to use m-commerce.

The study also investigated the effect of PEOU on the Muslim consumers' PU. The results imply that PEOU has a significant effect on PU in m-commerce supporting Hypothesis 5. This result aligns with Andavara et al. (2021) who discovered that PEOU and PU have a significant positive relationship. Consumers may find m-commerce useful so long as it is easy to use (Barry et al., 2024a). Users are motivated to use m-commerce systems when it is easy to use (Barry et al., 2024b). When consumers can easily use m-commerce systems to get accurate information, they can surely use it (Barry et al., 2024c; Barry and Jan, 2018). This result is also supported by Barry and Jan (2016) found a significant relationship between PEOU and PU. Therefore, this indicates that PEOU is a

prerequisite for PU in m-commerce. In contrast, this result contradicts Mahaputra and Mahaputra (2023), who found no significant relationship between PEOU and PU.

The study also investigated the mediation effect of PU in the relationship between PEOU and Muslim consumers' intention to use m-commerce in Malaysia. The results indicate that PU has no mediation effect in the relationship between PEOU and the Muslim consumers' intention to use m-commerce providing no support to Hypothesis 7. This result contradicts Andavara et al. (2021) who found that PU mediates the relationship between PEOU and intention. In contrast, Widiar et al. (2023) revealed no mediating effect of PU in the relationship between PEOU and intention. It could be argued that so long as the m-commerce system is useful Muslim consumers will always find a way to learn how to use it, which may lead to creating a more favourable and positive intention to use it.

7 Managerial implications

Muslim consumers' intentions will increase if m-commerce providers improve their technology, including their platforms, to be reliable, advantageous, and user-friendly. The strong correlation between the perceived utility and ease of use directly impacts the inclination to employ m-commerce. To enhance the adoption rate of m-commerce among Muslim consumers in Malaysia, m-commerce providers should utilise a series of strategic marketing decisions and integration strategies to cultivate a favourable and optimistic awareness in the minds of Muslim consumers in Malaysia. The Malaysian Communication and Multimedia Commission (MCMC) and other policymakers in Malaysia should implement robust policies to guarantee superior internet connectivity in the communications sector. This would enable m-commerce providers to offer exceptional services, motivating Muslim consumers to participate in m-commerce activities. To promote the acceptance of m-commerce among Muslim consumers in Malaysia, m-commerce providers need to establish robust partnerships with website and app designers, smartphone manufacturers, and telecommunication companies.

To increase the rate at which m-commerce is embraced, designers of m-commerce applications or websites could arrange seminars or training sessions to acquaint users with the features and procedures of m-commerce. However, this will allow users to be familiarised with m-commerce systems, and it will also allow providers to answer all queries the user may have about their system and reduce stress by providing support to users. They must interact with users, ensuring that confidentiality and data protection issues are addressed and emphasising the security and privacy standards in place while using m-commerce. Businesses must also assure Muslim consumers that their financial data is protected throughout any m-commerce transaction. This will encourage customers to engage in m-commerce and stimulate the expansion of the m-commerce industry in Malaysia, ultimately significantly impacting the Malaysian economy.

m-commerce providers must allocate resources and make strategic investments to enhance the application's performance, ensuring it meets or surpasses user expectations. Consistently evaluate and enhance the technological components, speed, and overall functionality to positively influence customer behavioural intention. Enhanced performance may have a direct correlation with heightened user intention. They must emphasise user experience design to develop intuitive platforms that require minimal cognitive effort to navigate. Enhancing PEOU and optimising perceived behavioural

control can substantially impact Muslim consumers' intention to use m-commerce. It is essential to have ongoing monitoring and user feedback systems to achieve continual improvement. They must address technical and logistical concerns swiftly to establish a seamless workflow. Create an optimal atmosphere for application utilisation by enhancing Muslim customers' attitudes and behavioural control. Possible enhancements could include enhancing server efficiency, addressing software problems, and guaranteeing a seamless user experience. Enhancements in attitudes and behavioural control directly influence Muslim consumers' behavioural intentions. They should maintain and improve Muslim consumers' subjective norms to positively influence behavioural intention. They should provide strong Muslim customer support to improve behavioural intention, leading to a higher m-commerce adoption rate in Malaysia.

8 Conclusions

This study explores the drivers of m-commerce among Muslim consumers in Malaysia, specifically concentrating on attitude, PU, subjective norms, PEOU, and perceived behavioural control. The paper proposes a framework for future investigation and practical experimentation, highlighting the aim of utilising m-commerce to enhance the effectiveness of service providers. After data analysis, the results show that subjective norms, PEOU, and PU significantly predict Muslim consumers' intention to use m-commerce. Likewise, PEOU strongly predict PU. Additionally, the result revealed that subjective norms, PEOU, and PU are the most critical factors driving Malaysian Muslim consumers' intention to use m-commerce. In contrast, the findings revealed that attitude and perceived behavioural control do not predict Muslim consumers' intention to use m-commerce. Therefore, m-commerce providers should focus on subjective norms, PU, and PEOU to improve Muslim consumers' intention to use m-commerce in Malaysia. Nevertheless, this study is limited by its belief in quantitative data and lack of qualitative evidence to uphold its claims. In Malaysia, Muslim consumers' intention can also be influenced by privacy, security, cost, perceived trust, or cultural factors. Future studies could employ a qualitative method, such as interviews or focus group discussion, to enhance m-commerce activities and foster positive intention among Muslim consumers in Malaysia. Furthermore, the data gathered in the Klang Valley of Malaysia does not encompass the entirety of Malaysia Muslim consumers. Potential future studies could encompass additional states and undertake comparative studies between Malaysia and other Islamic states. Lastly, the research framework of this study can be used in various contexts of technological behavioural intention.

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Declarations

The authors declare that there is no conflict of interest.

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