



# Understanding the determinants of e-wallet continuance usage intention in Malaysia

Nurul-Ain Abdul-Halim<sup>1</sup> · Ali Vafaei-Zadeh<sup>1</sup> · Haniruzila Hanifah<sup>1</sup> ·  
Ai Ping Teoh<sup>1</sup> · Khaled Nawaser<sup>2</sup>

Accepted: 11 October 2021 / Published online: 9 November 2021  
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## Abstract

The present research aims to investigate the determinants of e-wallet continuance usage intention in Malaysia using extending Technology Continuance Theory (TCT) via examining four variables, namely price benefit, trust, habit, and operational constraints. This paper adopts a quantitative approach to collect data with non-probability sampling using the purposive sampling technique. An online survey was conducted and a total of 379 respondents submitted their answers. The obtained results have shown that continue use of e-wallet is not affected by perceived usefulness (PU) and trust. However, there is a significant influence associated with perceived ease of use (PEU), PU, and satisfaction toward user's attitude that, in turn, substantially impacts the users' intention to continue to use e-wallet. This is one of the prior studies exploring Malaysian's intention to continue using e-wallet, using the TCT model as the research framework, and through examining four variables adopted from the literature, including price benefit, habit, trust, and operational constraints. The practical implications for the service providers and policymakers from the present findings can be used to develop strategies to gain a sustainable, competitive advantage, and promote continuous intention of e-wallet usage.

**Keywords** E-wallet · Mobile wallet · Technology continuance theory (TCT) · Intention to continue use · Cashless society · Malaysia

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✉ Ali Vafaei-Zadeh  
vafaei@usm.my

Nurul-Ain Abdul-Halim  
ainhalim11@gmail.com

Haniruzila Hanifah  
haniruzila@usm.my

Ai Ping Teoh  
apteoh@usm.my

Khaled Nawaser  
khalednawaser56@gmail.com

<sup>1</sup> Graduate School of Business, Universiti Sains Malaysia, Penang, Malaysia

<sup>2</sup> Institute of Scientific Research and Graduate School, Universidad de Lima, Lima, Peru

## 1 Introduction

Mobile applications have progressively risen to prominence, and such applications' usage is rapidly growing (Hew 2017). The electronic wallet (e-wallet) is one of the modern-day technological innovations that has penetrated and dominated economies in both developing and developed countries. As a result, there continues to raise scholarly focus on the continued usage of information technology by users, particularly e-wallet applications (Lu et al. 2017; Zhou 2011). Numerous e-wallet solutions, such as mobile internet shopping apps (applications), mobile transactions services and e-wallet available in the Apple Store and Play Store. Based on previous studies, e-wallet has gained more popularity in developing nations due to the plentiful possibilities of purchasing via mobile phones. Of all these methods, e-wallets have remarkably changed the way people carry out their financial transactions. Some popular e-wallets in Malaysia include Touch and Go (TnG) e-wallet, GrabPay Wallet, JomPAY, WeChat Pay, and Boost Pay. Like other electronic payment systems, the benefits of e-wallets for users such as simplicity and flexibility by Kow et al. (2017), and the freedom to conduct a transaction without destination or time constraints by Qasim and Abu-Shanab (2016), have drawn more users to install the apps. Variables such as perceived ease of use (PEU) and perceived usefulness (PU) were analyzed to study the acceptance of users and their intention to continue using e-wallet (Cho 2016; Hung et al. 2012; Liébana-Cabanillas et al. 2015; Makanyeza and Mutambayashata 2018; Venkatesh and Davis 2000).

Malaysia is a prime market for e-wallet adoption among consumers based on its high rate of smartphone and internet penetration, large young and tech-savvy population, and high banked population as stated in (PwC 2018). Bank Negara Malaysia has taken the initiative to decrease the use of paper-based instruments such as cash and cheques by transitioning into the community of e-wallets (Bagla and Sancheti 2018). Therefore, one of the primary goals is to reduce cash use because cash management is expensive (Bank Negara Malaysia 2018). Motivated by government assistance, many municipal e-wallet servicers are springing up to provide mobile payment services like the e-wallet platform, including both banks and non-banks. Furthermore, many traders such as retailers, food and beverages premises, small sellers, small shops, e-commerce companies and transportation providers, inspired by the industry's growth, accept payment via e-wallet (Sivathanu 2019). In addition, the e-wallet is expected to be embraced by tech-savvy and young customers as the device has the potential to conduct numerous services and young people are drawn to emerging mobile technologies more than ever (Lu 2019; Sinha et al. 2019).

From a corporate point of view, analyzing user acceptance and intention to continue to use is of great importance as the abnormality and inefficient use of emerging technology may also lead to business failures (Bhattacharjee 2001). Therefore, by examining the reasons underlying why users are motivated to use e-wallet, application developers and service providers will then design plans and business strategies to convince prospective adopters to use e-wallets. This will guide marketers to design a more productive, wearable e-wallet with price benefits such as coupons and will highly increase the intention to continue to use e-wallet. Thus, continued use of technology, such as e-wallets, can be promoted; however, the application cannot yet be fully adopted as the digital transfer needs to have a legitimate justification such as trust to use e-wallet rather than using a debit/credit card. Similarly, e-wallet has also been encouraged by the Malaysian government, which has gifted 30 MYR (about 7.20 USD) one-off for e-wallet users to improve the pace of adoption (Times 2019), making users across all ages to install Touch and Go (TnG) e-wallet to redeem the e-wallet money, for instance. However, many

people install the e-wallet application to receive the incentive given by the government, but they would not continue to use e-wallet once the incentive amount is consumed. A survey investigated on mobile app usage indicated that after three months of an app installation, only 24% of the users continue using it and this percentage decreases to 14% after six months and only 4% after one year of installation (Ding and Chai 2015). Most of the previous studies paid attention to e-wallet adoption (Kapoor et al. 2014; Qasim and Abu-Shanab 2016; Teng and Khong 2021). This gap leads the current study to continue to use issue of e-wallet and necessitates an in-depth understanding of the factors influencing continued usage of such technology. Thus, the present work addresses the research query below:

RQ: What factors affect users' continuous usage intention of e-wallet applications while all the facilities are already on the table?

Hence, this study is one of the prior ones toward determinants of e-wallet continuance usage by focusing on continuance intention. Therefore, this research aims to find the determinants of e-wallet continuance usage intention in Malaysia by enhancing the richness of technology continuance theory (TCT) with four variables, namely, price benefit, trust, habit, and operational constraints. This paper applied TCT as the key theoretical framework to examine the determinant factors of e-wallet continuance usage in Malaysia. Many prior studies (Cheng et al. 2019; Daragmeh et al. 2021; Foroughi et al. 2019; Khayer and Bao 2019; Rahi et al. 2020) have been carried out to examine TCT with a variety of empirical data and in various application contexts, but the findings have not always been consistent. Moreover, TCT, is solely not capable of identifying these factors; therefore, TCT has been extended here by price benefit, habit, trust, and operational constraints, according to a critical literature review.

As the adoption of e-wallet grows, e-wallet keeps encouraging safe electronic business transactions between organizations and/or individuals (Ondrus and Pigneur 2006). Therefore, this study considers e-wallet as any payment where a mobile device is used to trigger, approve, and validate a business transaction (Au and Kauffman 2008). Results of this study may contribute to e-wallet providers and other industries improving the systems and services in order to keep their current users satisfied. When more users started to feel satisfied with the e-wallet, the adoption rate of e-wallet in Malaysia could be escalated. That being so, it will make life easy for users and transform the way organizations communicate with users by leveraging big data and analytics to better understand customer insights. Moreover, using e-wallet significantly contribute to a cashless society (Alam et al. 2021; Singh et al. 2020). While there is a considerable need to understand the behavior of the user-group level, too little attention has been paid to inquiring into the factors of continuance usage of e-wallet in Malaysia to achieve the cashless society culture as proposed by Wei et al. (2018) in a way that the continuance intention rate of using e-wallet can indeed be accelerated. In addition, continued use of e-wallet contributes to individuals' daily lives through time- and cost-effective financial transactions (Nizam et al. 2018). It also brings more hygiene life to the people during the ongoing Covid-19 pandemic and helps governments to control the covid-19 pandemic as physical wallet and cash may also increase the chance of covid transmission.

## 2 Theoretical background and hypotheses development

### 2.1 Theoretical background

TCT was introduced by Liao et al. (2009) that is an improved theory describing the usage of information system continuity. It is indeed made up of integration of three theories,

namely Technology Adoption Model (TAM), Expectation Confirmation Model (ECM), and Cognitive Model (COG). While ECM explains the variables that impact user retention and loyalty rather than initial acceptance, TAM investigates initial acceptance. However, in terms of application and explanatory power, the TCT outperforms the TAM, ECM, and COG models by a significant margin (Liao et al. 2009). Furthermore, the TCT suggests that long-term usage rather than initial acceptance determines service success.

Therefore, TCT has six variables, including PEU, PU, confirmation, attitudes, satisfaction, and intention to continue to use, and incorporates the two main aspects of satisfaction and attitude within a single continuity model (Liao et al. 2009), aiming at obtaining the well-established PEU and PU variables as a reference to the first level. It is a three-level model with the goal to retain an information system continuity as the final dependent variable (Liao et al. 2009). The model of continued use of the information system was explored based on Expectation-Confirmation Theory (ECT), commonly used in the marketing field to track the effects of customer satisfaction on their intention to continue to use application technology (Jia et al. 2017). The continuation of information systems at the individual level is also critical for the survival of different e-commerce companies from business to consumer such as internet service providers (ISPs), and online vendors, banks, agents, travel agencies, etc. (Bhattacharjee 2001). The continuous use of e-wallet is characterized by two post indicators, namely PU and satisfaction. Therefore, we have formulated the research framework based on TCT and four variables such as price benefit, trust, habit, and operational constraints (Fig. 1).

## 2.2 Review of prior studies

TCT originally had two pre-compliance confirmations, including perceived results and expectations, which have been omitted because Bhattacharjee (2001) proposed that their implications were included in confirmation and satisfaction frameworks, thus introduced a perceived usefulness variable. A study by Talwar et al. (2020) has also ventured PU as a determinant of e-wallet applications satisfaction. According to Humrani and Wiese (2019), TCT is proved to have a strong exploratory ability to clarify PU, satisfaction, attitude, and intention to continue using e-wallet. Therefore, TCT is used as the main research framework in this study.

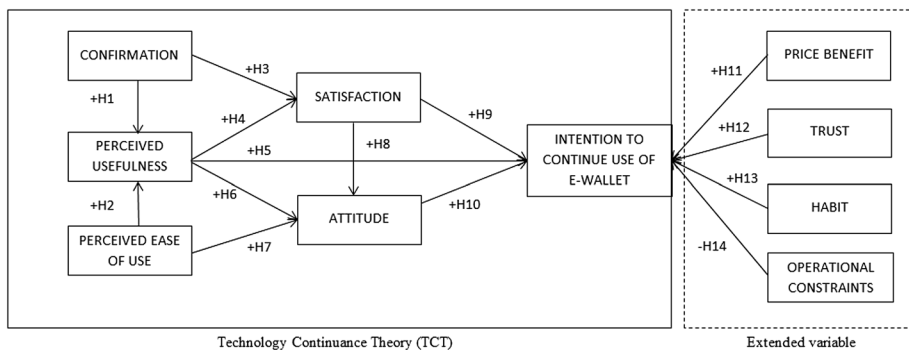


Fig. 1 Research framework

Digital payment applications such as e-wallet will not incur any additional fees, but consumers may receive financial rewards from discounts on paying via applications. Therefore, 'cost' has been adapted in the literature as a 'price benefit' (Pal et al. 2019), being used in the present work as well. Moreover, using e-wallet applications as an exchange instead of using real money requires trust toward the system. Users will indeed be able to entrust transactions on their money through the mobile payment service providers and networks as the transfers are securely linked to their bank accounts. The mobile wallets accordingly hold some money just like a bank account. Trust is connected to the user's sense of safety toward the system and is critical for mobile payment systems (Qasim and Abu-Shanab 2016). Thus, trust is another factor adapted to the present research model. The practice of utilizing mobile payments is expected to trigger a potential intention for users to use such payment systems (Sinha et al. 2019). Therefore, habit is also adopted as one of the important extension variables in this study. However, with alarmingly poor digital literacy rates all around the world, we should also take into account the fact that operational constraints indeed exist and the main obstacle to cell phone proliferation is then the failure of people to successfully utilize the applications (Zhou 2011). With these variables, and according to the literature, TCT alone is therefore inadequate for understanding the effect of continuance usage intention of e-wallet. Thus, extended TCT with the four variables, price benefit, habit, trust, and operational constraints have accordingly been applied in the present work (see Table 1).

## 2.3 Hypotheses development

### 2.3.1 Confirmation

The word 'confirmation' represents the level of satisfaction of an individual (Liao et al. 2009). The level of approval and post-adoption perceptions of e-wallet indeed influences the degree of PU and quality of the services (Bhattacharjee 2001). Lim et al. (2019) proved the relationship between confirmations and PU after purchasing goods and showed that user confirmation after purchasing has a positive impact on their e-commerce shopping satisfaction. Confirmation experience may modify the PU of e-wallet, particularly if the primary PU of consumers is not clear due to being confused by what to expect from e-wallet (Hassan and Wood 2020). Users, for example, may misperceive the benefits of a modern system simply because they are not sure what to expect from that. While PU is likely to fall into the initial stage of using e-wallet, such expectations may probably shift when users understand that their initial expectations seem unrealistically weak. In other words, the trust of user is enhanced by confirmation (Foroughi et al. 2019).

In this study, 'satisfaction' refers to customer satisfaction as an internal variable with the internal assessment and psychological state of the user (Liao et al. 2009). It is indeed a positive outcome of a global performance assessment based on the prior experience of procurement and usage (Foroughi et al. 2019). The confirmation of the initial requirements of e-wallet services, according to TCT, leads to satisfaction of the subsequent users, while the reverse process triggers disappointment and desire to discontinue. Previous studies have shown that confirmation contributes favorably to satisfaction. It was also discovered on e-wallet systems that user's approval after initial usage of systems had a major impact on customer satisfaction (Liébana-Cabanillas et al. 2015).

**Table 1** Overview of some previous studies

Study	The objective of the study	Theory used	Major Research Findings	Country
Lew et al. (2020)	To investigate e-wallet usage among hospital customers	MTAM, critical mass theory, self-efficacy theory, and flow theory	Technology self-efficacy and perceived critical mass have no effect on the intention to use mobile wallet	Malaysia
Leong et al. (2020)	Predicting mobile wallet resistance	Innovation resistance theory (IRT)	Education and perceived novelty have negative effects on m-wallet resistance	Malaysia
Singh et al. (2020)	To investigate factors affecting user's recommendation to use mobile wallet	TAM and UTAUT2	Ease of use, usefulness, perceived risk, attitude, to have a significant effect on user's intention	India
Shao et al. (2019)	To review several key backgrounds of building trust in China's mobile third-party payment platforms	Innovation Diffusion theory	Important differences between genders in terms of different trust building mechanisms for mobile payment	China
Cao et al. (2018)	To investigate the mechanism for building trust and to analyze the impact of trust on mobile payment user's satisfaction and continued purpose	Trust transfer theory	The findings suggested that through satisfaction, the trust transfer cycle positively affects the continuing purpose of mobile payment	China
Agrebi and Jallais (2015)	The aim of this study was to identify the determinants affecting the intention to make purchases using mobile phone	Technology acceptance model (TAM)	Perceived enjoyment on the intention to make transactions using smartphones, the second difference concerns with the effect of satisfaction on the intention to make purchases using smartphones	France
Slade et al. (2015)	To explore factors influencing the intentions of non-users to take Remote Mobile Payment (RMP) in the UK	Unified Theory of Acceptance and Use of Technology (UTAUT), Extended with more consumer-related constructs	To understand the factors influencing the preferences of UK non-users to embrace RMP, that can be changed to improve the adoption, which will also encourage the continued acceptance of MC	United Kingdom
Zhou (2013)	To study factors impacting continuance intention of mobile payment	Information Systems success model and satisfaction as a dependent variable	Trust, flow, and satisfaction define the continuance intention of mobile payment	China

**H1** Confirmation has a positive impact on PU.

**H2** Confirmation has a positive impact on satisfaction.

### 2.3.2 *Perceived usefulness (PU)*

PU is defined as the subjective probability of the user to increase job performance using a special application framework (Liao et al. 2009). It is also described as expectations of users toward e-wallet performance. According to the TCT model, when a consumer confirms his initial perceptions about essential components of a technology adopted, then starts to view that technology as useful for carrying out a responsibility to complete given tasks such as transactional activities. In several ways including e-wallet, PU is a significant predictor of behavioral intention to continue use e-wallet (Shaw and Sergueeva 2019). In addition, PU is shown to be a key factor in influencing the mindset of individuals and their decision to continue use e-wallet services (Foroughi et al. 2019). Generally, PU is determined by the perception of the usefulness and sacrifices required to use e-wallet as users often need to take it into consideration when making decisions about continuity (Hsu and Lin 2018). In other words, as users are supposed to reach a designated goal, they tend to experience an increase in PU (Cho, 2016). PU indeed affects both satisfaction and decision to use e-wallet in a way that the higher the PU of e-wallet apps, the more the number of users that continue to use the apps supported by their attitude and intention. Indeed, nearly over 80% of the TCT-based studies have investigated both the impacts of PU on continuous intention to use e-wallet and those of PEU on PU (Yang and Wang 2019). Vafaei-Zadeh et al. (2021) found that PU has a positive impact on users' attitude towards using car dash-cam. It is therefore argued that PU is a prominent trait for e-wallet providers (Li and Liu 2014), and the following hypotheses are accordingly established:

**H3** PU has a positive impact on satisfaction.

**H4** PU has a positive impact on intention to continue use of e-wallet.

**H5** PU has a positive impact on attitude.

### 2.3.3 *Perceived ease of use (PEU)*

The acceptance of new technological developments by people could also be viewed as a catalyst. Thus, it is indeed expected that people will use new technologies if they find them convenient to use. PEU makes humans understand the convenience of using modern technologies. In this study, PEU refers to the degree to which the prospective users expect the target system to be effortless (Liao et al. 2009). External factors such as characteristics of system design, which make individuals believe in using application, can produce some effects. The level of satisfaction, which either confirms or prevents the desire to retain PEU, is an estimate of the degree to which a person feels that using a specific technology should be mentally effortless. The perceptions of an individual contribute to optimistic or pessimistic emotions regarding the use of e-wallet, which, in turn, affect their real acceptance (Foroughi et al. 2019). On the other hand, PEU is argued to be a determining factor of PU in online transactions, which must then play an important role in customer readiness for e-wallet continuance use and in having decent connection with PU (Sinha et al. 2019).

Therefore, that PEU can have a substantial impact on the decision to continue use e-wallet is rational (Yang and Wang 2019). The researcher accordingly hypothesizes that:

**H6** PEU has a positive impact on PU.

**H7** PEU has a positive impact on attitude.

### 2.3.4 Satisfaction

User satisfaction is presented as a linear function proportional to discontinuance. Confirmation and satisfaction are strongly intercorrelated, since confirmation implies that anticipated gains from actual uses are indeed realized (Lim et al. 2019). The other factor is attitude, which is described as the user's perceptive evaluation of e-wallet, whereas satisfaction refers to individuals' impressions of e-wallet applications (Venkatesh and Davis 2000). It has been reported that satisfaction positively affects the attitude toward different technological applications (Foroughi et al. 2019). Satisfaction, thoroughly investigated in the e-wallet literature, has been shown to play a crucial role in predicting various outcomes of user conduct such as continuous usage (Li and Liu 2014). According to ECM, the researcher argues that satisfaction may easily influence the purpose of e-wallet continuance use (Cheng et al. 2019). The feeling of acceptance by users after using e-wallet applications is indeed derived from satisfaction with the system, which, in return, will affect their attitude to continue use of e-wallet. The literature indicates that the level of customer satisfaction with e-wallet could be the main reason for the decision to reuse the application (Tran et al. 2019). Consequently, the researcher suggests that:

**H8** Satisfaction has a positive impact on attitude.

**H9** Satisfaction has a positive impact on intention to continue use of e-wallet.

### 2.3.5 Attitude

The term attitude refers to the degree of a person's positive or negative feelings about performing the target behavior (Liao et al. 2009; Vafaei-Zadeh et al. 2019b). The behavior of consumers in using technologies is governed by their mindset as proposed by the present research framework. Many studies have reported a positive link between attitude and intention to continue use e-wallet applications (Wu and Chen 2017). Consequently, attitude is believed to be a leading determinant, forecasting users' intentions to continue use the e-wallet (Foroughi et al. 2019). A study by Weng et al. (2017) indicated that attitude might have a positive impact on the intention to continue use. Consumers that exhibit positive perceptions toward e-wallet are enthusiastic about accepting and using it (Cheng et al. 2019). However, PEU, PU, and satisfaction will influence the level of attitude to e-wallet that users have, and at last, will impact the intention to continue using it. Accordingly, the researcher considered the following hypothesis:



**H10** Attitude has a positive impact on intention to continue use of e-wallet.

### 2.3.6 Price benefit

In general, compared to other available alternatives, information and communication technology (ICT) has provided more benefits, including also minimized costs. The economically weaker sections in the emerging economies are reluctant to spend extra expenses on technology, particularly when there is a low-cost alternative such as e-wallet. When there is a cost advantage, the situation changes as banking applications and other electronic payment systems worldwide offer discounts to promote these payment systems, resulting in increased use of them as well (Malay Mail 2020). As e-wallet systems offer price advantages, users' intention to continue to use the application increases too. Multiple e-wallet applications, appeared over the past couple of years, have offered numerous price benefits in terms of discounts to fight one another and seize the market (Pal et al. 2020). Owing to the high price sensitivity of disadvantaged sectors of the society, consumers may expect to continue using such applications as e-wallet provides price advantages (Pal et al. 2019). Consequently, the researcher suggests the following hypothesis:

**H11** Price benefit has a positive impact on intention to continue use of e-wallet.

### 2.3.7 Trust

Queries about protection and privacy-related risks appear to be more serious regarding money transfers through mobile devices as individual and personal information is saved on such devices (Sharma and Sharma 2019). Trust in applications to conduct e-wallet activities must therefore depend on requirement and privacy (Goad et al. 2020). Hence, trust is a significant key component to raise the intention to continue use and satisfy users to carry out e-wallet activities. Decision-makers and service providers are also recommended to concentrate on trust-based partnerships during the early stage of the partnership to encourage nonstop use. As the e-wallet seems to be a rather personalized service, users continue to be concerned about the confidentiality and protection of the data saved on their own devices. Therefore, this study hypothesize that:

**H12** Trust has a positive impact on intention to continue use of e-wallet.

### 2.3.8 Habit

Habit is a crucial factor affecting continued use of technology repeatedly as decision-making considerations, which is also related to the usefulness or functionality of applications (Chávez Herting et al. 2020). People must remain in the context over a fairly long period of time in order to evolve e-wallet and make it become a tradition or practice. Thus, people who have used e-wallet for some time will understand the habit and the ease of using such systems to do their transactions (Karjaluoto et al. 2019). It is therefore expected that the practice of using e-wallet would result in potential plans for users to continue using e-wallet (Pal et al. 2020). We accordingly hypothesize that:

**H13** Habit has a positive impact on intention to continue use of e-wallet.

### 2.3.9 Operational constraint

Operational constraints take place when a person finds a technology fairly challenging to learn or to use. Debates argue that mobile application technologies play a major role in their inaccessibility, experience obstacles and problems, such as restricted mobile data plans, and mobile service external barriers including security concerns, difficult online support tutorials, irrelevant pop-ups, and lack of customization options (Ma et al. 2016). In the case of e-wallet, the limited scale of mobile applications including limited displays and tiny multifunction keypads may be burdensome to use and hinder application responsiveness (Zhou 2011). Users often face obstacles that will eventually stop them from accepting innovation (Podsakoff et al. 2003). With modern device interfaces that integrate complicated features in mobile phones, consumers may then face challenges in utilizing payment applications. Therefore, operational constraint is a key variable adopted in users continue use of e-wallet, and we accordingly anticipate that,

**H14** Operational constraints adversely affect intention to continue use of e-wallet.

## 3 Methodology

### 3.1 Sampling

In order to test the hypotheses, we have conducted a structured online survey among Malaysians who have used e-wallets at least once in their lives. This research uses non-probability sampling employing purposive sampling technique. One filtering question was accordingly applied to guarantee the accuracy of the results. Assuming that path coefficients had a significance level of 5% and a statistical power of 80% to detect a medium impact of 0.15 (Cohen, 1988) with seven predictors in the research framework, a number of 103 respondents were therefore needed. However, the collected data in this study are greater than the necessary number. A questionnaire along with a cover letter was distributed using several communications apps, including emails, Whatsapp, and Facebook, and other digital channels and surveyors were invited to complete and return the questionnaire online.

### 3.2 Common method bias (CMB)

The single factor score of Harman was used to detect common method bias (CMB) (Podsakoff et al. 2012). The CMB is said to be present if the factor extraction is restricted to one factor, and if the variance defined by one factor exceeds 50% (Vafaei-Zadeh et al. 2020). To reduce the risk of common method bias (CMB), the design of the questionnaire was double-checked before data collection to verify that the sections for independent variables and dependent variables were positioned separately. Moreover, all the independent variables were measured with 5-point Likert scale, whereas

dependent variable was measured with a 7 Likert scale as suggested by Podsakoff et al. (2012) (Vafaei-Zadeh et al. 2018). Furthermore, this study did not collect any information from the respondents that revealed their identification as this would minimize the likelihood of biases like social desirability bias. Finally, Harman's single-factor test was used to verify CMV once the data was gathered. The results showed a single factor solution accounted for only 27.3% of the total variance, which suggested that CMB was not a concern. The unmeasured approach to latent marker variable by Podsakoff et al. (2012) was also used to assess the shift in  $R^2$ . No CMB issue was also detected based on the fact that change in  $R^2$  was less than 3% after introducing an endogenous variable (Vafaei-Zadeh et al. 2020).

### 3.3 Measures

All constructs in this study include a 5-point Likert scale of 1 (strongly disagree) to 5 (strongly agree) except intention to continue use e-wallet, which has a Likert scale of seven points (Appendix). The measurement variable confirmations were adopted from Bhattacharjee (2001). The measurement items PU and PEU were also adopted from Venkatesh and Davis (2000). The measurement items satisfaction and attitude were adopted from Bhattacharjee (2001) and Schierz et al. (2010), respectively. The measurement items price benefit and trust were respectively adopted from Venkatesh et al. (2012) and Pal et al. (2020). The measurement items habit, operational constraints, and intention to continue use e-wallet were adopted from Pal et al. (2020), Song (2011), and Alraimi et al. (2015), respectively. The demographic profiles of the respondents such as gender, age, educational background, and occupations were also collected and tabulated in Table 2 based on the measurement items.

## 4 Data analysis and results

### 4.1 Data analysis

The sample (Table 2) illustrates the related responses collected from the online survey, with a total number of 379. Table 2 shows that the total number of male respondents is 228 (60.16%), while that of the female respondents is only 39.84%. Moreover, only two respondents with ages below 18 represented 0.53%, while those between 18 and 29 (most of the users) represented 75.46%. Respondents within 30–49 and 40–49 years old also respectively represented 16.10% and 5.54%. At the same time, the age of 50 and above contributed about 2.37%. The number of SPM/secondary school respondents represented 7.91%, and users with diploma degree, and master's degrees contributed about 21.11%, 57.00% and 10.55% each. The two Ph.D. respondents represented 0.52%, while certificates ones and others contributed 2.11 and 0.8%, respectively. In total, there were five types of occupation, including corporate industries with 30.61%, government with 10.82%, education with 4.22%, student with 25.33%, and others with 29.02%. In terms of income range, the highest frequency of respondents was 115, which represented 30.34% for users with incomes less than 1000 MYR a month, 15.30% for 1000–2000 MYR, 24.27% for 2001–3000 MYR, 16.89% for 3001–4000 MYR, and 13.20% for 5000 MYR and above. Regarding the e-wallet usage sectors, the majority of their usage of e-wallet was in food

**Table 2** Demographic profile

Measures	Items	Frequency	Percentage (%)
Gender	Male	228	60.16
	Female	151	39.84
Age	Age less than 18	2	0.53
	18–29	286	75.46
	30–39	61	16.10
	40–49	21	5.54
	50 and above	9	2.37
Education	SPM/Secondary	30	7.91
	Diploma	80	21.11
	Degree	216	57.00
	Master's degree	40	10.55
	Ph.D	2	0.52
	Certificate	8	2.11
	Others	3	0.80
Occupation	Corporate	116	30.61
	Government	41	10.82
	Education	16	4.22
	Student	96	25.33
	Others	110	29.02
Income	Less than RM1000	115	30.34
	RM1000-RM2000	58	15.30
	RM2001-RM3000	92	24.27
	RM3001-RM4000	64	16.89
	RM5001 and above	50	13.20
e-wallet major usage by sector	Food delivery	131	34.56
	Food & Beverage	98	25.86
	Groceries	84	22.16
	Bill payment	52	13.72
	Others	14	3.70

delivery (34.56%), followed by 25.86% for food and beverage and 3.70% in other sections such as mobile reload, bill payment, petrol, etc.

## 4.2 Results

Initially, the model was evaluated for convergent validity analyses with the help of factor loading, Average Variance Extracted (AVE) and composite reliability (CR). The PLS Algorithm results demonstrated that all item loading values are higher than 0.707 and all AVE values are higher than 0.50 and that both show convergent validity at construct-level (Hair et al. 2014). In addition, all the CR values are higher than 0.70, thereby confirming the convergent validity of the measures (Table 3). Table 4 displays heterotrait-monotrait ratio of correlations (HTMT<sub>.85</sub>) values below 0.85 thus the acceptable discriminant validity of the measurement model is therefore achieved (Henseler et al. 2015; Vafaei-Zadeh et al. 2019a).

**Table 3** Convergent validity

Construct	Item	Loading	CR	AVE
Confirmations	CONF1	0.890	0.915	0.781
	CONF2	0.872		
	CONF3	0.889		
Perceived Usefulness	PU1	0.807	0.934	0.741
	PU2	0.865		
	PU3	0.902		
	PU4	0.854		
	PU5	0.872		
Perceived Ease of Use	PEU1	0.747	0.927	0.718
	PEU2	0.847		
	PEU3	0.875		
	PEU4	0.897		
	PEU5	0.863		
Satisfaction	SAT1	0.939	0.968	0.884
	SAT2	0.944		
	SAT3	0.948		
	SAT4	0.931		
Attitude	ATT1	0.926	0.948	0.858
	ATT2	0.930		
	ATT3	0.922		
Price Benefit	PB1	0.909	0.903	0.822
	PB2	0.905		
Trust	TRU1	0.930	0.946	0.855
	TRU2	0.948		
	TRU3	0.895		
Habit	HAB1	0.900	0.946	0.814
	HAB2	0.904		
	HAB3	0.903		
	HAB4	0.902		
Operational Constraints	OC1	0.905	0.941	0.801
	OC2	0.889		
	OC3	0.922		
	OC4	0.863		
Intention to continue use e-wallet	INT1	0.919	0.964	0.869
	INT2	0.948		
	INT3	0.931		
	INT4	0.933		

CR Composite reliability, AVE Average variance extracted

According to the present study, both PU and satisfaction were affected by confirmation and PEU. PU has a significant impact on satisfaction and attitude, while marginally affects the intention to continue use e-wallets. PEU, PU, and satisfaction all have significant impacts on attitude and consequently will affect the intention to continue use e-wallet. Attitude, price benefit, habit, and operational constraints also have a huge impact on the

**Table 4** Discriminant validity (HTMT<sub>.85</sub> Ratio)

Construct	ATT	CONF	HAB	INT	OC	PEU	PU	PB	SAT	TRU
ATT										
CONF	0.664									
HAB	0.561	0.553								
INT	0.723	0.584	0.745							
OC	0.374	0.289	0.307	0.396						
PEU	0.745	0.639	0.559	0.633	0.437					
PU	0.809	0.722	0.598	0.676	0.392	0.781				
PB	0.553	0.438	0.449	0.617	0.153	0.465	0.491			
SAT	0.709	0.659	0.647	0.775	0.350	0.707	0.745	0.550		
TRU	0.732	0.646	0.686	0.702	0.325	0.637	0.708	0.560	0.710	

*CONF* Confirmation, *PU* Perceived usefulness, *PEU* Perceived ease of use, *SAT* = Satisfaction, *INT* = Intention to continue use, *ATT* Attitude, *PB* Price benefit, *TRU* Trust, *HAB* Habit, *OC* Operational constraint

**Table 5** Summary of hypothesis testing

Hypothesis	Relationship	Coefficient ( $\beta$ )	Std. Dev	t-value	Q <sup>2</sup>	R <sup>2</sup>	f <sup>2</sup>	VIF	Supported
H1	CONFPU	0.346	0.052	6.710	0.409	0.597	0.200	1.485	YES
H2	PEU PU	0.520	0.049	10.594			0.452	1.485	YES
H3	CONFSAT	0.256	0.055	4.674	0.433	0.525	0.081	1.708	YES
H4	PUSAT	0.533	0.047	11.266			0.350	1.708	YES
H5	PUINT	-0.021	0.054	0.388	0.568	0.705	0.001	2.818	NO
H6	PUATT	0.422	0.070	6.004	0.500	0.619	0.186	2.516	YES
H7	PEUATT	0.248	0.060	4.161			0.070	2.316	YES
H8	SATATT	0.205	0.064	3.182			0.050	2.184	YES
H9	SATINT	0.301	0.072	4.202			0.118	2.601	YES
H10	ATTINT	0.200	0.072	2.767			0.049	2.757	YES
H11	PBINT	0.154	0.044	3.485			0.057	1.417	YES
H12	TRUINT	0.033	0.055	0.599			0.001	2.531	NO
H13	HABINT	0.317	0.052	6.132			0.180	1.904	YES
H14	OCINT	-0.094	0.034	2.767			0.025	1.192	YES

*CONF* Confirmation, *PU* Perceived usefulness, *PEU* Perceived ease of use, *SAT* = Satisfaction, *INT* = Intention to continue use, *ATT* Attitude, *PB* Price benefit, *TRU* Trust, *HAB* Habit, *OC* Operational constraint

intention to continue use of e-wallet, while trust is not significant for the continuation of e-wallet usage. By applying a blindfolding method, results showed that the Q<sup>2</sup> value for attitude, perceived usefulness, satisfaction, and the intention to continue using e-wallet was not less than 0, indicating that the predictive relevance is acceptable (see Table 5).

According to Table 5, confirmation (H1,  $\beta=0.346$ ,  $t=6.710$ , and  $p=0.000$ ) and PEU (H2,  $\beta=0.520$ ,  $t=10.594$  and  $p=0.000$ ) positively affect PU. Confirmation (H3,  $\beta=0.256$ ,  $t=4.674$  and  $p=0.000$ ) and PU (H4,  $\beta=0.533$ ,  $t=11.266$  and  $p=0.000$ ) have a positive impact on satisfaction. PU, also, has no impact on intention to continue use of e-wallet (H5,  $\beta=-0.021$ ,  $t=0.388$  and  $p=0.349$ ). PU (H6,  $\beta=0.422$ ,  $t=6.004$  and  $p=0.000$ ), PEU (H7,  $\beta=0.248$ ,  $t=4.161$  and  $p=0.000$ ), and satisfaction (H8,  $\beta=0.205$ ,  $t=3.182$  and  $p=0.001$ ) positively affect attitude. Satisfaction (H9,  $\beta=0.301$ ,  $t=4.202$  and  $p=0.000$ ), attitude (H10,  $\beta=0.200$ ,  $t=2.767$  and  $p=0.003$ ), price benefit (H11,  $\beta=0.154$ ,  $t=3.485$  and  $p=0.000$ ), and habit (H13,  $\beta=0.317$ ,  $t=6.132$  and  $p=0.000$ ) have a positive impact on intention to continue use e-wallet, in contrast to trust (H12,  $\beta=0.033$ ,  $t=0.599$  and  $p=0.275$ ) with a marginal impact. Operational constraints have also exhibited a significant, adverse effect toward intention to continue use of e-wallet (H14,  $\beta=-0.094$ ,  $t=2.767$  and  $p=0.003$ ) (see Fig. 2).

### 5 Discussion

Enhanced by TCT with extended variables, the present study investigated the determinants of intention to continue use of e-wallets in Malaysia. Results confirmed all the hypotheses postulated here, except two of them, which are the impacts of PU and trust on intention to continue use of e-wallet. Goad et al. (2020) and Sharma and Sharma (2019) also showed that trust significantly affects intention to continue use of mobile technology such as e-wallet. Results also verified that continuance intention to use e-wallet was positively influenced by satisfaction, attitude, price benefit, habit, and operational constraints, in agreement with the literature (Pal et al., 2020).

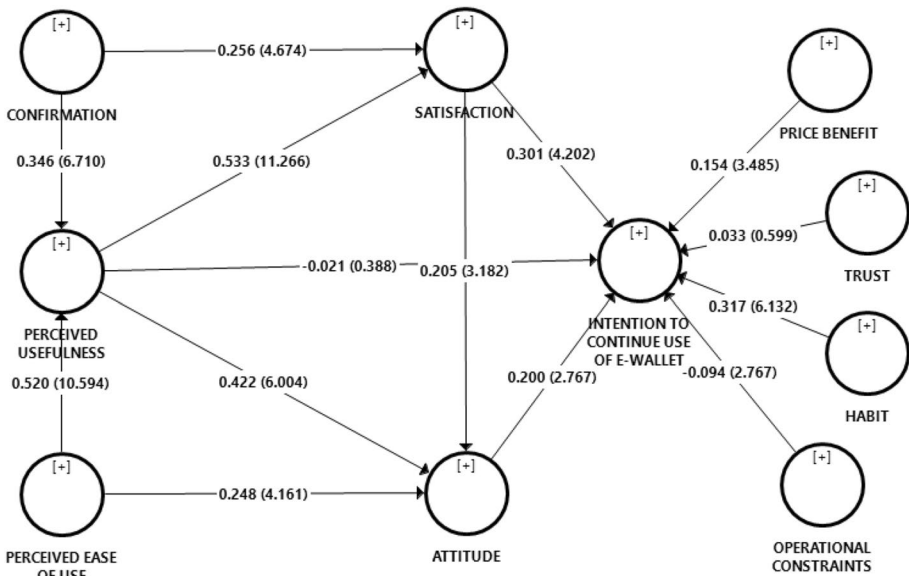


Fig. 2 Structural model

## 5.1 Relationship between Confirmation and PU

Confirmation has a positive impact on PU with a medium effect size ( $f^2=0.200$ ), which postulates that the related hypothesis is acceptable. Confirmation toward e-wallet applications is the feeling of satisfaction after using them. The associated post-feeling also has a significant impact on continuation use of e-wallet applications. Developers should understand that e-wallet application features and preferences will make users feel happy and comfortable, thus, increases the level of PU, which will, in return, impact the intention to continue use of e-wallet.

## 5.2 Relationship between PEU and PU

PEU was found to have a significant impact on PU with a large effect size ( $f^2=0.452$ ) confirming that the related hypothesis is therefore acceptable. Through using e-wallets, users perceived that transactional activities would make their everyday lives easier and increases job performance. Contentment for post-usage will also generate a positive impact on attitude toward continuance usage of e-wallets. Therefore, service providers and policymakers need to take into account the fact that users tend to continue using e-wallets when the function of the system is at full throttle (Shaw and Sergueeva 2019).

## 5.3 Relationship between confirmation and satisfaction

Satisfaction has a marginal influence on confirmation of e-wallet applications with a small effect size ( $f^2=0.081$ ), showing that the increased level of confirmation on e-wallet applications will markedly impact the level of satisfaction that users feel as well as the intention to continue use of e-wallets. Hence, service providers should not only produce an application that only satisfies certain groups of target users, but also generally understand the overall users' preferences in order to elevate the level of satisfaction toward the system.

## 5.4 Relationship between PU and satisfaction

The obtained results show that PU has a substantial impact on user satisfaction, in agreement with the findings of Weng et al. (2017) and Gilani et al. (2017), with a large effect size ( $f^2=0.350$ ). Usefulness of a technology means that more tasks could be done using fast and easy applications. These findings also show that more satisfaction could be obtained by claiming that the e-wallet application is useful. Service providers then need to build and maintain close connections with users to satisfy their needs and desires toward e-wallet applications. It is therefore fair to believe that user satisfaction will increase if close connections with users and mutual understanding are established.

## 5.5 Relationship between PU and intention to continue use e-wallet

PU was found to have no significant impact on intention to continue to use of e-wallet with an effect size of  $f^2=0.001$ . The results are consistent with the previous study (Liao et al.



2009). There are indeed few potential reasons for such a result. First, the respondents of this study already have knowledge about the functions of e-wallet applications, which will make their lives easier and increase job performance. This is because there is no invention that will burden users, rather, it reduces hassle and eases the process. Therefore, users' intentions to continue to use are not affected. Service providers need to improve users' expectations of usefulness, improve their lives and assist them in developing positiveness. Second, e-wallet is known to help users manage anything using credit cards, membership cards, customer loyalty cards, and more, by agreeing to the terms and conditions of any e-wallet application, users are well apprised of the use of e-wallets. These are the reasons underlying why PU is not significant toward intention to continue use of e-wallets, since users are already aware of the usefulness unless e-wallets have features newly introduced. Therefore, the direct impact of PU on intention might be significant on the early stage of adoption. Service providers need to step up the game if they want more users to use their applications, or they might lose their importance in shaping customers' perceptions of usefulness.

### 5.6 Relationship between PU and attitude

PU has a significant impact on attitude with effect size ( $f^2=0.186$ ) showing that the associated hypothesis is accepted and it confirmed the previous study by Chatterjee et al. (2021). User's attitude toward e-wallet application systems is influenced by the PU of those applications. Users perceive that e-wallets will improve their job performances via less queueing time to pay bills and no parking fee to enter the store for conversation payment. As a result, all of those payments can be made with comfort at home or wherever it is convenient for the users.

### 5.7 Relationship between PEU and attitude

Users' perceptions toward the notion that e-wallets are applications will ease their lives and job tasks and increases the level of attitude toward e-wallets. Here, the associated hypothesis with effect size ( $f^2=0.050$ ) has been accepted. The result is in line with previous studies (Hung 2021; Shih and Chen 2013) and indicated that a higher level of attitude would impact the intention to continue to use of e-wallet. When users feel that an e-wallet application is easy to use, this will largely influence them to be optimistic about that application. Service providers should therefore develop applications capable of making people's everyday activities easy and consequently yield a positive attitude toward e-wallet apps.

### 5.8 Relationship between satisfaction and attitude

Satisfaction largely affects attitude with effect size ( $f^2=0.050$ ) indicating that the related hypothesis is accepted within the research framework. When users psychologically feel satisfied with an e-wallet application, they will then show a higher attitude toward it, which, in turn, affects intention to continue use of e-wallet. Hence, developers must be sure that their users will be satisfied with their applications, and the level of satisfaction accordingly increases.

## 5.9 Relationship between satisfaction and intention to continue use of e-wallet

The marked influence of user satisfaction on the continuous use of e-wallet applications was also verified in the study in agreement with the literature (Gilani et al. 2017). The results show that there is a medium effect size ( $f^2=0.118$ ) approving the acceptance of the related hypothesis. When users feel satisfied with the system interface, ease of operation, and facing less issues during transaction will increase the satisfaction level toward e-wallet application and will then positively impact the intention to continue using e-wallet.

### 5.9.1 Relationship between attitude and intention to continue use e-wallet

The present results show that attitude has a positive affects intention to continue use of e-wallets with small effect size ( $f^2=0.049$ ) and confirms the associated hypothesis of this study, in agreement with the literature (Weng et al., 2017). Indeed, users' positive attitudes toward e-wallets will impact their decisions to continue using those applications. Service providers should then allocate some time and effort to make their applications less issue-prone and more user-friendly, yielding optimistic views on the applications as well.

### 5.9.2 Relationship between price benefit and intention to continue use e-wallet

Cashback in terms of discounts, vouchers, and coupons is the price advantage experienced by e-wallet users. Here, price benefit has been found to be positively related to intention to continue use of e-wallet with effect size ( $f^2=0.057$ ), indicating that the related hypothesis is acceptable. People enjoy cashback arising from e-wallets, which drives them to continue using the applications. This can be consider as a treat from the application and improves the significance of price benefit, which will finally impact the intention to continue use of e-wallet.

### 5.9.3 Relationship between trust and intention to continue use e-wallet

Results related to trust vary depending on the associated objective ( Yang and Mossholder, 2010). From the obtained t-value, effect of trust on intention to continue use e-wallet was found to be insignificant and marginal with effect size ( $f^2=0.001$ ), which was against the researcher's expectation, also contradicting the study of Qasim and Abu-Shanab (2016). The first reason for such a contradiction is due to the fact that most of the participants were young consumers, suffering from a lack of knowledge about fraud, data risk, and personal data piracy issues. They were not fully aware of the fraud that could indeed happen, and that is why the researcher accordingly added the variable trust into the model. Second, users who were generally assumed to be IT-savvy were well-informed about the fact that transactions through any e-wallet application could be risk-prone. They were fully aware that even if they trust the applications, there are still few things requiring attention such as bank details and personal information that were filled in. As a result, trust is not significant within the continuance usage of e-wallet context.

### 5.9.4 Relationship between habit and intention to continue use of e-wallet

'People greet when they meet each other' is considered as a habit. With medium effect size ( $f^2=0.180$ ), the obtained results show that habit has a significant impact on intention to continue use of e-wallet. Users who customarily use e-wallet applications will then keep on using them and automatically utilize e-wallets for payment transactions. Hence, the intention to continue use of e-wallets is increasing.

### 5.9.5 Relationship between operational constraints and intention to continue use e-wallet

It is indubitable that operational constraints will significantly affect intention to continue using e-wallets. Operational constraints such as phone lagged, and limited internet coverage at rural areas make users stop using e-wallets. Service providers will then need a high-speed service, new e-wallet optimizations, and system stability to improve e-wallet applications, which, in turn, reduces the operational constraints of e-wallet (Yuan et al. 2016). In other words, the less the operational constraints that users face within using e-wallets, the more intention to continue use of e-wallets.

## 6 Study

### 6.1 Theoretical contribution

This study is indeed one of the first attempts to use TCT with four extension variables to elucidate the intention of e-wallet usage continuance in Malaysia. Results suggest that TCT alone is inadequate to justify the intention to continue using e-wallets, because price benefits, habits, and operational constraints have substantial impacts on the user's behavior to continue using e-wallet applications. These three factors have been established for the purpose of continuance usage of e-wallets. Moreover, the marginal effects of PU and trust on intention to continue use of e-wallets verify the view that the intention to continue using e-wallet would lose support in case users feel e-wallet applications do not fit their standards.

This paper also has a few implications for e-wallet service providers and policymakers. A thorough understanding of the determinants of the intention to continue using e-wallets would enable service providers to identify points relevant to the continued use of e-wallets after the first adoption. The critical influence of satisfaction on e-wallet usage indicates that e-wallet applications must continuously be reinforced and protected. The existing studies have also shown that consumer preferences are changing over time (Liao et al. 2009), therefore, service providers and developers should capture and solve user uncertainties in order to guarantee that e-wallets remain their favorite use. The findings of this study can also be helpful in the contexts of other countries, where the prevalence of e-wallets is strong and service providers and policymakers are looking to grow the number of e-wallet users. Experts should comply with and respond to changes promptly. Last but not least, an increase in e-wallet users in Malaysia will directly affect and support Malaysian's visions toward a paperless environment.

## 6.2 Practical contribution

The present findings show that confirmation and perceived usefulness are two vital factors influencing user satisfaction. Therefore, once users experience a perfect system that can ease their daily transactions, they may feel more satisfied. Hence, current e-wallet service providers must ensure their service gives an excellent experience and is useful in their customers' daily transactions. To do so, service providers are required to expand their e-wallet services to cover most of the daily transactions. This required more merchants to accept their e-wallet payments. Therefore, an e-wallet is perceived to be useful if it performs various functions such as money transfer, paying utility bills, redeeming rewards, P2P transfer, and many more. The significant effect of PEU on PU and attitude indicates that the users appreciate an easy-to-use e-wallet system. The e-wallet system designers should note that as the system has a wide range of users of different ages or education, an easy-to-use system would increase their intention to continue using e-wallet. Therefore, an easy to use e-wallet application can keep the app in the users' installed application lists. Operational constraints negatively affect intention to continue using e-wallet that indicates the importance of a stable system. Therefore, service providers are advised to establish a system with minimum technical issues. A system crash or bugs in the system will cause substantial financial losses and customer losses.

Moreover, attitude was found to have a significant effect on continue to use e-wallet. However, improving the user's perception of e-wallet may enhance the degree of attitude. On the other hand, user satisfaction is also a fundamental predictor of intention to continued use of e-wallet. In order to get users to continue to use e-wallet, it is required a higher level of satisfaction and attitude. However, system developers must ensure the benefits of ease of use, usefulness, and confirmation so that the users are satisfied experiencing a user-friendly and useful system. The result of this study may also contribute to the Malaysian government, which aims to encourage e-wallet usage for a safe, contact-free payment experience. Continued use of e-wallet may contribute to the government plan which indeed is a cashless society. Consequently, a cashless transaction would also help the government break the Covid-19 pandemic as the physical card, wallet, and cash may ease the virus transmission. The government may continue motivating people by giving incentives to the e-wallet users at the benefits of such motivators are more than its losses for the government.

## 6.3 Conclusion and future study

This paper targets the determinants that influence intention to continue use of e-wallet applications within the TCT framework along with four extended variables, including price benefit, trust, habit, and operational constraints. The proposed model incorporates the interpersonal and technical implications of the system. Out of the fourteen hypotheses made here, twelve of them were accepted, while the remaining two hypotheses, related to the effects of trust and PU on intention to continue use of e-wallets, were found to be insignificant and meaningless within the applied framework. This implies that user's behavioral intention to continue use of e-wallet applications does not rely on trust and PU. This research not only investigates the use of e-wallets on a continuous basis, but also thoroughly understands the theoretical concerns. Analyzing the obtained results elucidate critical issues such as users' views of the efficacy and trust toward the system.

While this research has successfully achieved its objectives, it contains some drawbacks that need to be aware of. First, since this research was performed in a developing nation, the results may not accurately represent e-wallet continue to use in other nations. As a consequence, researchers should pay attention when generalizing their findings, and they should consider undertaking a cross-national study to improve the generalizability of their findings. Second, this study extended TCT with four variables such as price, benefit, trust, habit, and operational constraints to account for a considerable amount of variance ( $R^2$  70%) in intention to continued use of e-wallet. However, there are other variables that can be included in future studies such as perceived covid-19 risk to extend TCT and eliminate the variables which were insignificant in this study. Third, in terms of the data collecting technique, this study used a cross-section, which makes it impossible to analyze the evaluation of users' behavior intention over time. Hence, longitudinal research would enable us to confirm the stability of the existing hypotheses.

## Appendix

List of items by construct.

Construct	Measurement Items	Source
Confirmations	CONF1 CONF1: My experience with using e-wallet was better than what I expected	(Bhattacharjee 2001)
	CONF2 CONF2: The service level provided by e-wallet was more than what I expected	
	CONF3 CONF3: Overall, most of my expectations from using e-wallet were confirmed	
Perceived Usefulness	PU1 PU1: Using e-wallet enables me to do transactions more quickly	(Venkatesh and Davis, 2000)
	PU2 PU2: Using e-wallet makes doing transactions easier	
	PU3 PU3: Using e-wallet enhances the effectiveness of my transactions	
	PU4 PU4: Using e-wallet would improve the quality of the transactions performed	
	PU5 PU5: Using e-wallet would be useful for my transactions	

Construct		Measurement Items	Source
Perceived Ease of Use	PEU1	PEU1: Learning to operate e-wallet easily is for me	(Venkatesh and Davis, 2000)
	PEU2	PEU2: I find e-wallet easy to use	
	PEU3	PEU3: Interaction with e-wallet does not require a lot of mental effort	
	PEU4	PEU4: My interaction with e-wallet is clear and understandable	
	PEU5	PEU5: I find it easy to use e-wallet to do what I want	
Satisfaction	SAT1	SAT1: I am satisfied with e-wallet	(Bhattacharjee 2001)
	SAT2	SAT2: I am pleased with e-wallet	
	SAT3	SAT3: I am contented with e-wallet	
	SAT4	SAT4: I am delighted with e-wallet	
Attitude	ATT1	ATT1: Using e-wallet services is a good idea	(Schierz et al. 2010)
	ATT2	ATT2: Using e-wallet services is a beneficial	
	ATT3	ATT3: Using e-wallet services is a wise idea	
Price Benefit	PB1	PB1: I am using e-wallet apps for the following benefits: e-wallet apps offer discounts and cash back	(Venkatesh et al. 2012)
	PB2	PB2: I am using e-wallet apps for the following benefits: I save money when I pay through e-wallet apps	
Trust	TRU1	TRU1: I am continuing to use e-wallet apps because: e-wallet apps meet my interests	(Pal et al. 2020)
	TRU2	TRU2: I am continuing to use e-wallet apps because: My needs are met by my e-wallet apps	
	TRU3	TRU3: I am continuing to use e-wallet apps because: The e-wallet apps have features as promised by the providers	

Construct		Measurement Items	Source
Habit	HAB1	Hab1: I am continuing to e-wallet apps because: Using e-wallet apps has become a habit for me	(Lee et al. 2011)
	HAB2	Hab2: I am continuing to use e-wallet apps because: I am used to apply e-wallet apps	
	HAB3	Hab3: I am continuing to use e-wallet apps because: I automatically use e-wallet apps	
	HAB4	Hab4: I am continuing to use e-wallet apps because: Using e-wallet apps is natural to me	
Operational Constraints	OC1	OC1: Sometimes, I am not able to use e-wallet because: e-wallet app's display and screen make it difficult to use	(Song 2011)
	OC2	OC2: Sometimes, I am not able to use e-wallet because: e-wallet apps often freeze or malfunction	
	OC3	OC3: Sometimes, I am not able to use e-wallet because: The buttons and options of the e-wallet apps are difficult to find	
	OC4	OC4: Sometimes, I am not able to use e-wallet because: The features provided by the e-wallet apps are not sufficient for my needs	
Intention to continue use e-wallet	INT1	Int1: I intend to continue using e-wallet in the future	(Alraimi et al. 2015)
	INT2	Int2: I will continue using e-wallet in the future	
	INT3	Int3: I will strongly recommend e-wallet for others to use it	
	INT4	Int4: I will keep using e-wallet as regularly as I do now	
Total		37 Items	

**Acknowledgements** This paper is part of a research funded by Webe Digital Sdn Bhd Grant Number 304/PPAMC/6501220/W110.

## Declarations

**Conflict of interest** The authors declare that they no conflict of interest.

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