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Digital wallets: a study on the influence of consumer perceptions and attitudes on impulsive consumer behaviour

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Digital wallets, or electronic wallets (e-wallets), have developed to be the most common form of digital payment methodology in Indonesia in line with the significant growth in internet accessibility and adoption of financial technology (fintech). Accordingly, there has been a corresponding increase in research into the adoption, use, and impact of digital wallets. However, contemporary research has focused disproportionately on the positive outcomes of digital wallet use, with limited exploration of the potential negative consequences. The objectives of this study were to understand the relationship between digital wallet use and impulsive spending behaviour of consumers by examining the effect of perceived ease of use (PEOU), perceived enjoyment (PE) and perceived usefulness (PU) towards the impulsive behaviour (IB) with consumer attitude (CA) as a mediating variable. This study used convenience sampling to obtain data from 238 active digital wallet users residing in the DKI Jakarta area aged between 18 and 41. Results demonstrated that PE and PU had significant and positive impacts on CA, while PEOU did not. Further, CA did not have a significant influence on the dependent variable of IB. The research model accounted for 71% of the variance in CA, and 5.4% of the variance in IB. Results demonstrated there was no significant effect from consumer attitude as a mediator. The outcomes indicate the research model adequately and substantially explained the impact on the mediator consumer attitude; however, do not adequately explain impulsive behaviour. This research will contribute to the growing body of literature exploring the spectrum of outcomes of digital wallet use and inform the readership on the importance of perceived enjoyment and perceived usefulness of digital wallet use in driving consumer attitude.

KEYWORDS

consumer attitude, digital wallet, impulsive behaviour, perceived ease of use, perceived enjoyment, perceived usefulness

Introduction

Significant growth in internet accessibility in Indonesia has created space for financial technology (fintech) to develop at a rapid pace, with mobile payment options now likely to be the most regular method for cashless payments in the nation (Teoh et al., 2020). To add context to Indonesia's internet accessibility, the rate of internet penetration was 66.48% of the total Indonesian population of 275 million in 2022, with 67.88% of the total population owning or using at least one cellular telephone (Badan Pusat Statistik (BPS–Statistics Indonesia), 2023). This growth in internet accessibility and high level of internet penetration has supported a substantial increase in the use of digital payment methodologies, including electronic wallets (e-wallets). However, Indonesia is not alone in experiencing this fintech evolution. Looking globally, the use of digital payment methodologies has grown 51.3% in the

period from 2021 and 2024, with the most growth of 67.7% observed in Asia during that time (Cap Gemini Research Institute, 2023).

Digital wallets perform a similar function to normal wallets, albeit in digital form. They facilitate convenient financial transaction methodology by digitising users' financial account information and funds for use via mobile phone applications or websites (Yang et al., 2021). Further, digital wallets can be integrated with other digital services such as electronic commerce (e-commerce) platforms, food delivery, and ride-hailing applications, expanding their utility for consumers and enhancing ease-of-use of the associated e-commerce platforms. In Indonesia there are a number of digital wallets that have become popular for digital payment use, with the three dominant providers being GoPay, OVO and DANA (Saputri and Pratama, 2021).

This research applies the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) model in conjunction with the Technology Acceptance Model (TAM). The moderating variables of age, gender and experience ordinarily applied in the UTAUT2 are not relevant to this study. The TAM model relies on two key determinants of an individual's perception of how a system would influence their ability to perform a job; these are perceived usefulness (PU) and perceived ease of use (PEOU) and are explored as independent variables in this study. The UTAUT2 and TAM are discussed in further detail under Literature Review.

The UTAUT and TAM frameworks have been applied extensively to studies exploring digital wallet use in the South-East Asian region. Othman et al. (2024) applied the UTAUT to explore the antecedent factors towards digital wallet adoption by users in Malaysia. Jin (2020) validated the TAM framework when also exploring digital wallet adoption factors in Malaysia. A separate study applied the UTAUT to explore digital wallet adoption and implications for consumptive behaviour by users in the Jakarta, Indonesia region, although results indicated digital wallet use did not significantly influence consumptive behaviour (Nur, 2024).

A number of contemporaneous studies from the South-East Asian region have explored the relationship between digital wallet use and impulsive consumer behaviour. In a study exploring digital wallet use by a generation Z cohort in Surabaya, Indonesia, Kasuma et al. (2024) found perceived enjoyment to have a positive and significant influence on impulsive behaviour. These findings were similar to a separate study by Lee et al. (2021) who demonstrated perceived enjoyment to be a key antecedent factor in predicting impulsive purchasing behaviour by digital wallet users in Malaysia. Sari et al. (2021) found perceived usefulness and consumer attitude both had positive and significant relationships with impulsive behaviour in a study on the influence of digital wallet use on impulsive buying behaviour by individuals in East Java, Indonesia.

This study aims to understand the potential relationship between consumer perceptions and attitudes towards negative outcomes of digital wallet use; that is, impulsive consumer behaviour. When considering impulsive consumer behaviour, Rook (1987) initially proposed it involves an immediate and strong desire to purchase something, which may occur with lesser consideration or contemplation of the consequences. Previous research has demonstrated that impulse buying can be driven by perceived enjoyment of digital wallet use (Lee et al., 2022a,b), and that a range of potentially negative consequences may be associated with this behaviour. In studying the antecedents and consequences of risky indebtedness behaviour, Abrantes-Braga and Veludo-de-Oliveira (2020) found consumers exhibiting impulsive behaviour were highly likely to demonstrate a high degree of risky indebtedness behaviour, which itself was a key component in explaining the relationship between impulsive behaviour and an individual's poor level of financial preparedness for emergencies. Further, the same study found a relationship between impulsive behaviour and a lack of financial wellbeing, as well as the role of anxiety in driving impulsive consumer behaviour which, consequently, influenced the degree to which the individual engaged in highly risky indebtedness behaviour (Abrantes-Braga and Veludo-de-Oliveira, 2020). Additional research into the consequences of impulsive buying by consumers in India found this behaviour can also lead to compulsive buying behaviour, potentially resulting in consumer overspending, an inability to repay debt, which in turn could have flow-on consequences for the individual and society more broadly (Pradan et al., 2018).

A wealth of contemporaneous literature has explored the benefits of digital wallet use and for good reason; in recent years, digital wallets have become the most used form of electronic payment instrument in Indonesia (Saputri and Pratama, 2021). Recent studies have examined how use of digital wallets can have a positive influence on financial inclusion for individuals in underbanked counties such as Indonesia, noting increased financial inclusion can be linked to better and more sustainable economic growth and development (Ciptarianto and Anggoro, 2022; Riandani et al., 2022). This has the potential to create meaningful impact considering the abovementioned high rate of internet penetration and cellular phone use among the total Indonesian population. Raharja et al. (2020) noted the increased use of digital payment methodologies and digital wallets could have broader economic impacts, including accelerated growth of micro small and medium enterprises (MSMEs) and enhanced financial contribution of small and medium sized enterprises (SMEs) to the Indonesian economy, while Maulana et al. (2022) found digital payment methodologies favourably influenced Indonesia's economic development.

In a study on consumer perceptions and attitude on buying intention using a buy now, pay later methodology, Jundiy and Ridanasti (2024) demonstrated perceived ease of use, perceived usefulness, and perceived enjoyment all significantly influenced consumer attitude towards buying intention. In exploring antecedent factors towards e-wallet adoption in Indonesia, Mahwadha (2019) found perceived usefulness to have a significant and positive influence on consumer attitude. Gunawan et al. (2019) also found perceived usefulness had a significant effect on consumer attitude in a study on consumer preferences and attitude towards purchase intentions using Indonesian e-commerce site Tokopedia. In this study, however, perceived ease of use was not found to have a significant impact on consumer attitude (Gunawan et al., 2019).

However, contemporaneous research has focused overwhelmingly on the positive outcomes of digital wallet use, resulting in a less developed understanding of the potential negative consequences, including impulsive consumer spending behaviour. However, some research has shown there to be causal relationships between digital wallet usage and problematic consumer behaviour. Aji and Adawiyah (2022) found perceived ease of digital wallet use positively affected excessive spending behaviour in young adult consumers, while Anggorowati and Sari (2024) found digital payment use had a positive impact on consumptive consumer spending behaviour. Further, Lee et al. (2022a,b) undertook two separate studies on digital wallet use in

Malaysia, identifying a significant effect on impulsive buying among consumers.

The disproportional focus in research on the positive outcomes of digital wallet adoption and usage requires attention. The objectives of this study are to assist in overcoming the identified shortcomings in the scientific literature and contribute to creating a more balanced and holistic understanding of the outcomes of using digital wallet payment methodologies. This study will contribute additional insight into the effects of digital wallet use on impulsive consumer spending behaviour by introducing a conceptual framework that previous research has not considered, with exploration of consumer attitude as a mediating variable. The desired impact of this study is not to detract from the demonstrated benefits of digital wallet use, but to equip readers with a better understanding of the potential negative outcomes to enable a more comprehensive understanding of the range of potential consequences and facilitate informed decision making.

Desired outcomes of study

The objective of this study is to provide the readership with an understanding of the potential negative consequences of digital wallet use. This will be balanced against the existing literature which focuses overwhelmingly on the positive outcomes and will enable readers and digital wallet users to make more informed decisions on digital wallet adoption. It is anticipated the outcomes of this study will also benefit policy agencies when considering the potential risks and consequences of digital wallet use with respect to government policy and legislation concerning digital wallets and payment methodologies. Further, this study will contribute to the broader body of research on digital wallet use and provide a more balanced understanding of the spectrum of consequences.

Literature review

Digital wallet

As a basic description, a digital wallet operates as a virtual account allowing users to store funds and complete financial transactions using a mobile device (Riandani et al., 2022). However, digital wallets enable users to undertake a range of functions beyond simply making financial transactions, including the ability to store virtual cash, coupons, and promotional offers, undertake financial transfers and withdrawals (Syifa and Tohang, 2020). The significant growth in popularity of digital wallets as payment methodologies has been widespread, but notably in Indonesia digital wallet payments have developed to become the most popular fintech methodology (Yang et al., 2021).

Unified Theory of Acceptance and Use of Technology 2

Developed by Venkatesh et al. (2012), the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) provides a revised version of the original UTAUT developed in 2012 and sets out a framework to understand the influencing factors for the use of, and intention to use, technology. The UTAUT2 framework encompasses performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit which represent key determinants of intention to use or usage behaviours. As part of the model there are three moderating variables; namely age, gender, and experience (Venkatesh et al., 2012).

The UTAUT and UTAUT 2 frameworks are applied widely in research to predict the behavioural intention for adopting use of technology (Hasan and Gupta, 2020). Further, these frameworks have been used extensively as the preferred theoretical frameworks to study digital payment adoption in a range of recent studies (Migliore et al., 2022). Therefore, UTAUT2 was a fitting theory to apply to this study to assist in determining the behavioural drivers of digital wallet use and the potential negative consequences with respect to impulsive consumer spending behaviour.

Technology Acceptance Model

The Technology Acceptance Model (TAM) was first proposed by Davis (1989a,b), adapting the Theory of Reasoned Action developed by Fishbein and Ajzen in 1975 to establish a method to understand the effect of system characteristics on a user's acceptance of technology, specifically computer-based information systems (Davis, 1989a,b; Saputra and Gurbuz, 2021). The TAM stipulates that variables of perceived ease of use (PEOU) and perceived usefulness (PU) determine an individual's acceptance and use of a system, with PU defined as "the degree to which an individual believes that using a particular system would enhance his or her job performance," while PEOU is defined as "the degree to which an individual believes that using a particular system would be free of physical and mental effort" (Davis, 1989a,b). The TAM has been applied to numerous research studies focussing on technology adoption and use, including studies exploring digital wallet adoption. Therefore, the TAM is an appropriate model to apply to this research study alongside the modified UTAUT2.

Perceived ease of use

Davis (1989a,b) defined perceived ease of use as "the degree that an individual presumes that the use of a system lacks effort." In expanding on Davis' definition, PEOU can be considered the "degree to which consumers feel relaxed and make efforts in the process of trying to learn to use financial technology (Fintech) services" (Hu et al., 2019), and "the extent to which users can be sure the system being used is easy to use and free of effort to learn" (Setiawan and Yanita, 2020). In a study on digital payment methodology adoption in Indonesia, Najib and Fahma (2020) demonstrated that the perceived ease of use of digital payments had a significant effect on the mediating variable of consumer attitude towards digital payment methodologies. In this study PEOU of digital wallets is hypothesised to influence consumer attitude towards digital wallets due to the user perception towards the ease of use to complete financial transactions, therefore:

> *H1:* Perceived ease of use (PEOU) will have a significant and positive impact on the mediating variable Consumer Attitude (CA).

Perceived enjoyment

Perceived enjoyment (PE) has been described as an activity that is enjoyable in its own right (Lee et al., 2022a,b), with previous research demonstrating PE to have a significant influence on the intention to use technology (Zhou and Feng, 2017). Indeed, adoption of new technologies is not entirely focussed on enhancing performance but is also as a source of enjoyment, and in the context of digital wallet adoption a higher degree of PE could reduce difficulty or worry experienced by users (Hasan and Gupta, 2020). Previous research by Lee et al. (2022a,b) found PE had a significant effect on digital wallet users' impulse purchases. In this study, PE is considered the degree to which users experience happiness and satisfaction when using digital wallets for financial processes and is hypothesised to influence consumer attitude towards digital wallet use. Therefore:

> *H2:* Perceived Enjoyment (PE) will have a significant and positive impact on the mediating variable Consumer Attitude (CA).

Perceived usefulness

As defined in the Technology Acceptance Model (TAM), Davis (1989a,b) explained perceived usefulness (PU) to be a process or system that can be perceived by the user to assist them to perform their job better. Per the TAM, PU is one of the primary factors that determines an individual's acceptance or rejection of information communication technology (ICT) and considers the extent to which an individual believes the adoption of certain ICT would enhance their job performance (Zhou and Feng, 2017). PU refers to how a process can fulfil or satisfy users' financial or lifestyle desires (Yang et al., 2021). Najib and Fahma (2020) previous research has demonstrated that users' perceived usefulness of digital payments has a positive and significant effect on consumer attitude towards digital payment methodologies (Najib and Fahma, 2020). In this study, PU is considered the degree to which users believe digital wallets facilitate effective financial processes and is hypothesised to influence consumer attitude towards digital wallet use. Therefore:

> *H3:* Perceived Usefulness (PU) will have a significant and positive impact on the mediating variable Consumer Attitude (CA).

Consumer attitude

Substantial research has been undertaken to examine and understand attitude as it relates to consumer intention or behaviour. Fishbein's theory of attitude proposed that an individual's attitude or evaluation of an object will be determined by their own subjective belief that the object possesses a certain attribute (Ajzen, 2008). In exploring this concept further, Ajzen (2008) identifies three major determinants of consumer intention towards a behaviour – perceptions of behavioural control, subjective norms, and attitudes towards the behaviour. When considering the components that comprise consumer attitude (CA) towards brands and behaviours, Batra and Ahtola (1991) proposed there to be distinct utilitarian and hedonic aspects. Further research considers CA to be how an individual may evaluate a behaviour in favourable or unfavourable ways (Murchison in Chetioui et al., 2020), or the degree to which a favourable or unfavourable estimation of that behaviour is held (Ajzen in Nguyen et al., 2019).

In the context of consumer use of fintech, Himel et al. (2021) proposed CA to be a consumer's positive or negative evaluation or belief towards the adoption of mobile financial services (MFS). In considering the relationship between CA and outcomes of digital wallet use, Sari et al. (2021) found CA had a significant positive correlation with impulsive buying, alongside a number of other indicators. In this study the mediating variable of consumer attitude is considered in the context of an individual's favourable or unfavourable evaluation of digital wallet adoption and use and is hypothesised to effect impulse consumer behaviour. Therefore:

> *H4:* Consumer Attitude (CA) will have a significant and positive impact on Impulsive Behaviour (IB).

Impulsive behaviour

Rook (1987) proposed impulsive consumer behaviour involves the onset of an instant, powerful and persistent desire to purchase something, which can happen with reduced consideration of the consequences. Impulse purchasing was considered by Piron (1991) as involving four criteria; first, it is an unplanned purchase; second, it is the result of an exposure to a stimulus; third, it is an 'on the spot' (i.e., impulsive) decision; and fourth, there are emotional and cognitive reactions. In further research by Rook and Fisher (1995), it was regarded that consumers may purchase spontaneously and immediately and be non-reflective. In this study IB will be considered as unplanned financial transactions and/or purchases of goods or services influenced by the user's attitude towards use of digital wallets.

Operationalisation of variables

The variables relevant to this study are operationalised as follows and reflected in Table 1 further below. In measuring all of the variables in this study a Likert interval scale will be used – refer *Participants and Procedure* for more information on the application of this scale.

Perceived Ease of Use (PEOU): Digital wallet users' subjective evaluation of the relative ease and level of effort required to use a digital wallet to perform financial activities.

Consumer Attitude (CA): Digital wallet users' subjective evaluation of the utility and usability of digital wallets.

Impulsive Behaviour (IB): Digital wallet users' purchasing behaviour that is spontaneous and unplanned.

Perceived Usefulness (PU): Digital wallet users' subjective evaluation of the effectiveness of digital wallets to facilitate financial activities.

Perceived Enjoyment (PE): Digital wallet users' subjective self-evaluation of the emotions experienced with respect to digital wallet use.

Hypothesis

Based on the literature presented above and the theoretical background, the paper proposed the framework below to

TABLE 1 Operationalisation of variables, indicators and scale.

Variable	Operational definition	Coding	Indicators	Scale	Adapted from
Perceived ease of use (PEOU)	Users' subjective perception of ease when using digital wallets to perform financial transactions	PEOU1 PEOU2 PEOU3 PEOU4 PEOU5 PEOU6	Free of effort Easy to use Consumers feel relaxed	Interval (Likert Scale 1–5)	Davis (1989a,b), Setiawan and Yanita (2020), and Hu et al. (2019)
Consumer attitude (CA)	Users' subjective attitude towards digital wallets	CA1 CA2 CA3 CA4 CA5	Favourable or unfavourable evaluation Positive or negative beliefs or evaluations Positive or negative appraisal	Interval (Likert Scale 1–5)	Chetioui et al. (2020), Himel et al. (2021), Hu et al. (2019), Nguyen et al. (2019), and Setiawan and Yanita (2020)
Impulsive behaviour (IB)	Users' subjective experience of unplanned financial transactions or purchases made	IB1 IB2 IB3	Unplanned, result of exposure to stimulus, on the spot Unplanned purchase of product or service	Interval (Likert Scale 1–5)	Piron (1991) and Lee et al. (2022a,b)
Perceived Usefulness (PU)	Users' subjective perception of the extent of usefulness in facilitating effective financial transactions	PU1 PU2 PU3 PU4 PU5	Enhance efficiency Speeds up task Increase convenience	Interval (Likert Scale 1–5)	Davis (1989a,b), Himel et al. (2021), Hu et al. (2019), and Zhou and Feng, 2017
Perceived enjoyment (PE)	Users' subjective perception of emotions experienced when using digital wallet	PE1 PE2 PE3 PE4 PE5	Enjoyment from use Satisfaction from aesthetics Fun in exploring new technology	Interval (Likert Scale 1–5)	Venkatesh and Davis (2000), Kim et al. (2017), and Lee et al. (2022a,b)

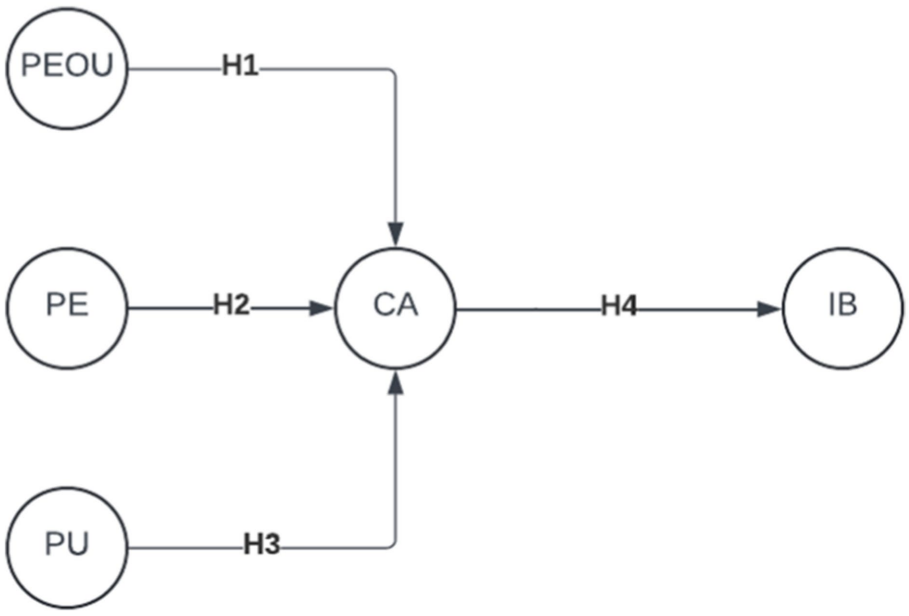

FIGURE 1
Conceptual framework.

demonstrate how impulsive consumer spending behaviour (IB) is affected by perceived ease of use (PEOU), perceived usefulness (PU) and perceived enjoyment (PE) of digital wallet use. Consumer attitude (CA) will be a mediating variable between the independent variables (PEOU, PU and PE) and dependent variable (IB) (Figure 1).

Methods

Participants and procedure

Quantitative data was collected as part of this study. The population in this study were digital wallet users living in the DKI Jakarta area aged between 18 and 41. This age group was specifically targeted because researchers anticipated an established level of financial independence and digital literacy within this cohort. The questionnaire was delivered in both English and Indonesian languages, and appropriate measures were implemented to ensure respondent confidentiality, particularly noting sensitive personal financial information was sought in this study.

Sampling

Convenience sampling was undertaken for this study for several reasons. Golzar et al. (2022) explain that convenience sampling requires less effort to select respondents in comparison to other non-random sampling techniques, is cost effective, and can provide a useful volume of qualitative data. These were relevant factors to this study which had limited time and financial resources available to the researcher.

In an effort to achieve representativeness and generalisability of results, the target population was deliberately kept broad to include individuals of both genders, of varying employment status (employed full-time, part-time, unemployed, studying) and was agnostic to employment type (private sector and public sector). This study specifically focussed on the age group of 18 to 41 as the target population, incorporating the Generation Z (18–25) and millennials (26–41) groups. Rolfe (2024) found that more than half of individuals in these groups in the United States context now use digital wallets with 80% considering mobile payment methodology was important to them. Similarly, research conducted by Capital One Shopping Research (2025) found Generation Z and millennial groups to be the predominant age group users of digital wallet technologies in the United States, with 69% of Generation Z and 73% of millennial respondents using digital wallets as their primary payment methodology for shopping in 2023, with this percentage decreasing for age groups of 41–56 (56%) and 57 + (30%).

Data collection

Data was collected via use of an online survey questionnaire developed using Google Forms, noting this method provides low resource overheads, quick collection of data, and an ability to achieve broad coverage of respondents (Vasantha Raju and Harinarayana, 2016). The questionnaire was distributed using social media platforms to reach a broad cross section of the target population, including Instagram, LinkedIn, and WhatsApp. Appropriate protective measures were implemented to ensure respondent confidentiality was maintained. The questionnaire applied a Likert interval scale from 1 (strongly disagree) to 5 (strongly agree). The validity of the Likert scale has been proven through substantial previous research and is therefore relied on in this study.

Data analysis and results

The sample consisted of 118 (49.6%) male and 120 (50.4%) female respondents ($N = 238$). From an educational perspective, most respondents ($N = 200$) had higher education qualifications such as Bachelors or Masters degrees (84.1%), followed by high school (11.3%; $N = 27$) and vocational/diploma qualifications (4.6%; $N = 11$). The key criterion for respondents was that they were active digital wallet users. Across the population we saw the greatest volume ($N = 105$) of respondents used a digital wallet between one and five times per week (44.1%), followed by the group using digital wallets greater than ten times per week (29.4%; $N = 70$) and the final group using between five and ten times per week (26.5%; $N = 63$). Respondents were in varying employment types, with private employees being the largest group (77.3%; $N = 184$), followed by unemployed individuals (12.2%; $N = 29$), and finally public employees (10.5%; $N = 25$). Respondents reported varying monthly average expenditure of Indonesian Rupiah (IDR) using digital wallets, with the majority ($N = 97$) spending greater than IDR2,000,000 (40.8%), $N = 71$ between IDR1,000,000 and IDR1,999,999 (29.8%) and $N = 70$ less than IDR1,000,000 (29.4%). Respondents' monthly income brackets varied from IDR3,500,000 to IDR9,999,999 (35.3%; $N = 84$), IDR10,000,000 to IDR19,999,999 (27.7%; $N = 66$) and IDR20,000,000 and above (37.0%; $N = 88$). The data relating to respondent profile is demonstrated in the Table 2.

TABLE 2 Respondent profile ($N = 238$).

Attribute	Frequency	Percentage
Gender		
Male	118	49.6%
Female	120	50.4%
Age		
18–25	66	27.7%
26–35	64	26.9%
36–41	108	45.4%
Formal education		
High school	27	11.3%
Vocational (diploma)	11	4.6%
Higher education (bachelors or masters degrees)	200	84.1%
Income per month		
IDR3,500,000 – IDR9,999,999	84	35.3%
IDR10,000,000 – IDR19,999,999	66	27.7%
IDR20,000,000+	88	37.0%
Occupation		
Private employee	184	77.3%
Public employee	25	10.5%
Unemployed	29	12.2%
How often digital wallet used		
1–5 times per week	105	44.1%
5–10 times per week	63	26.5%
More than 10 times per week	70	29.4%
Average monthly expenditure using digital wallet		
Less than IDR1,000,000	70	29.4%
IDR1,000,000 to IDR1,999,999	71	29.8%
IDR2,000,000+	97	40.8%

Data analysis was conducted using SmartPLS 4.0 using Partial Least Squares Structural Equation Modelling (PLS-SEM). SmartPLS was developed by Ringle et al. (2005) and is a multivariate analysis tool that allows users to examine relationships between variables through a graphical representation (Wong, 2013). PLS-SEM can be a useful model when sample sizes are small, as will be the case in this research study focussing on a minimum of 150 respondents (Wong, 2013).

As a first step, measurements of Cronbach's alpha and composite reliability were undertaken. Results are detailed in Table 3, with Cronbach's alpha (>0.7) and composite reliability (>0.7) both at adequate levels.

Next, discriminant variability was analysed further through a Fornell-Larcker test. Discriminant variability was confirmed, noting the square root of each item's average variance was greater than the intercorrelations (refer Table 4).

Hypothesis testing was undertaken, with path coefficients demonstrated in Table 5. To test the hypotheses, this study adopted a significance value of less than 0.05 or 5% and a *t*-value of more than 1.96 (Rice, 1988). PEOU was demonstrated not to have a positive and significant impact on CA ($\beta = 0.040$, $p = 0.567$), therefore H1 was rejected. PE was demonstrated to have a positive and significant impact on CA ($\beta = 0414$, $p = 0.000$), therefore H2 was accepted. PU was shown to have a positive and significant impact on CA ($\beta = 0.431$, $p = 0.000$), therefore H3 was accepted. Finally, CA was demonstrated not to have a positive and significant impact on IB ($\beta = 0.129$, $p = 0.345$), therefore H4 was rejected.

TABLE 3 Cronbach's alpha and composite reliability.

Variable	α	Composite reliability	AVE
Consumer attitude	0.924	0.942	0.768
Impulsive behaviour	0.865	0.909	0.771
Perceived enjoyment	0.945	0.958	0.821
Perceived ease of use	0.952	0.962	0.808
Perceived usefulness	0.926	0.945	0.774

TABLE 4 Fornell-Larcker criterion.

Variable	CA	IB	PE	PEOU	PU
CA	**0.876**				
IB	0.144	**0.878**			
PE	0.805	0.099	**0.906**		
PEOU	0.711	0.039	0.750	**0.899**	
PU	0.810	0.152	0.837	0.838	**0.880**

Bold represent the square roots of the Average Variance Extracted (AVE) for each construct. Results demonstrate discriminant validity has been established.

R-Square results demonstrated this model accounted substantially for the variance in consumer attitude at a level of 71% ($R^2 = 0.710$), however the variance in impulsive behaviour was explained at 5.4% ($R^2 = 0.054$) which is below the stipulated minimal acceptable value of 10% (Falk and Miller, 1992) (Table 6).

Examination of CA as a mediating variable was conducted through bootstrapping tests, with path coefficients demonstrated in Table 7. The conceptual framework proposed CA would mediate relationships between PEOU and IB, PE and IB, and PU and IB. The results of testing demonstrated that the proposed mediation effect was not supported. The indirect effects of PEOU on IB through CA was not significant ($p = 0.661$), PE on IB through CA was not significant ($p = 0.136$) and PU on IB through CA was not significant ($p = 0.163$).

Discussion

The objective of this study was to identify if the use of digital wallets resulted in increased impulsive consumer buying behaviour. Results of hypothesis testing indicated that perceived ease of use did not have a positive and significant effect on consumer attitude (p = 0.567), therefore H1 was rejected. These findings align with previous research conducted by Gunawan et al. (2019) on the role of consumer perceptions towards attitude and purchase decision-making regarding e-commerce site Tokopedia. In contrast, a separate study on consumer attitude and perceptions towards a buy now, pay later methodology did identify a significant and positive relationship present (Jundiy and Ridanasti, 2024). This difference in research outcomes suggests more examination is required on the relationship between perceived ease of use and consumer attitude in the domain of technology acceptance and adoption is required.

Perceived usefulness and perceived enjoyment were both found to have a positive and significant effect on consumer attitude ($p = 0.000$), confirming H2 and H3. This aligns with results observed by Jundiy and Ridanasti (2024) and serves to validate the Technology Acceptance Model (TAM) where perceived usefulness and perceived enjoyment are considered key antecedents of an individual's acceptance and adoption of technology (Davis, 1987).

This study did not identify a significant relationship between consumer attitude and impulsive behaviour ($p = 0.345$, t = 0.944), therefore H4 was rejected. No additional research could be located that examined the relationship between these variables; therefore, it is suggested that future research could assist in enhancing the available literature by exploring this relationship.

Results demonstrated there was no significant mediation effect of consumer attitude between the perceived ease of use and

TABLE 5 Significance testing results.

Hypothesis	Relationship	β	Standard Deviation	T-statistics	Sig	Hypothesis rejected or accepted
H1	PEOU→CA	0.040	0.073	0.573	0.567	Rejected
H2	PE → CA	0.414	0.078	5.343	0.000	Accepted
H3	PU → CA	0.431	0.087	4.870	0.000	Accepted
H4	CA → IB	0.129	0.132	0.944	0.345	Rejected

impulsive behaviour ($p = 0.661$), perceived usefulness and impulsive behaviour ($p = 0.163$), and perceived enjoyment and impulsive behaviour ($p = 0.136$). This indicates that consumer attitude does not play a mediating role between any of these relationship pathways.

The model predicts 71% ($R^2 = 0.710$) variance on the mediating variable of consumer attitude, interpreted in this study to be substantial, and 5% ($R^2 = 0.054$) of the variance in impulsive behaviour. These outcomes demonstrate the model adequately and substantially explains the impact on consumer attitude; however, do not adequately explain impulsive behaviour (Falk and Miller, 1992).

Conclusion

The results of this study demonstrate that the research model was able to account for a substantial amount of the variance in consumer attitude but was unable to do so for impulsive behaviour. Perceived usefulness and perceived enjoyment were both shown to have significant and positive effects on consumer attitude, whereas perceived ease of use did not have a significant effect on consumer attitude, and consumer attitude did not have a significant effect on impulsive behaviour. As no additional research could be identified examining the relationship between consumer attitude towards digital wallet use and impulsive consumer behaviour, it is difficult to provide validated reasoning for this outcome. It is recommended that further research be undertaken to better understand this relationship. Further, examination of consumer attitude as a mediator showed it did not play a significant mediating role in the relationship between independent variables of perceived ease of use, perceived usefulness and perceived enjoyment and the dependent variable of impulsive behaviour.

The outcomes of this study suggest there is more work needed to better understand the impacts of digital wallet use from the perspective of consumer spending behaviour. As noted, this study did not find a significant relationship between consumer attitude towards digital wallet use and impulsive consumer spending behaviour. Equally, additional research exploring the relationship between these variables with respect to digital wallet use was not immediately identified and therefore presents a gap in research that requires further exploration. Further, hypothesis testing of consumer perception and attitude variables in this study both aligned and differed with results from similar contemporaneous studies, suggesting there is a requirement for more research to be undertaken to better understand the nature of these relationships. Mediation analysis showed there to be no significant influence of consumer attitude in mediating the various relationship pathways explored, which could be due to a variety of factors including the modest sample size. Future studies with a larger sample size may be well-positioned to reconsider the influence of this specific mediator role.

TABLE 6 R-square.

Variable	R square
CA	0.710
IB	0.054

Theoretical implications

The outcomes of this study contribute to the developing body of research on consumer spending behaviour as it relates to the increasingly prominent phenomenon of digital wallets payment methodologies. This study provides a conceptual framework that may be relevant for future research to draw from when examining relationships between consumer perceptions, attitudes, and spending behaviours. Further, the research model and results serve to further validate the Technology Acceptance Model by demonstrating the relevance of perceived usefulness and perceived enjoyment towards consumer attitudes (Gunawan et al., 2019).

Practical implications

This study provides the readership with an insight into the importance of perceived enjoyment and perceived usefulness towards digital wallet payment methodologies. This may be useful for digital wallet providers in understanding how to positively influence consumer attitude towards the use of their products and services with the objective of achieving enhanced consumer engagement.

Research limitations and future recommendations

There are a number of limitations of this study that need to be considered. The sample size of $N = 238$ is relatively modest and drawn specifically from the DKI Jakarta region, which may limit the generalisability of this study's findings. Future research should consider applying this study's conceptual framework to a larger and more geographically dispersed sample.

Further, this study relied on convenience sampling due to time and resource constraints, rather than random selection. Consequently, there is the potential of sampling bias which may influence the results of this study. Future research could avoid this limitation by considering a random sampling approach.

Finally, this study relied on one-off completion of a survey questionnaire to gather data and did not have the capacity to examine

TABLE 7 Significance testing results on mediation effect.

Relationship	β	Standard Deviation	T-statistics	Sig	Significant effect
PEOU→CA → IB	0.006	0.014	0.439	0.661	Not significant
PE → CA → IB	0.063	0.041	1.494	0.136	Not significant
PU → CA → IB	0.066	0.045	1.396	0.163	Not significant

effects over a longer period of time. As a result, this study provides a snapshot in time only; future research could consider longitudinal studies in order to examine the longer-term impacts of digital wallet use.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the patients/participants or patients/participants legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

KU: Writing – original draft, Writing – review & editing. DT: Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The authors declare that no Gen AI was used in the creation of this manuscript.

Publisher's note

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