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# An Empirical Analysis of Consumers' Behaviour in Selecting and Adopting E-wallet Services in Indonesia

MSc Research Project  
MSc in FinTech (MSCFTD1)

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# An Empirical Analysis of Consumers' Behaviour in Selecting and Adopting E-wallet Services in Indonesia

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## Abstract

With recent developments in technology, there has been a noticeable shift of consumers' behaviour towards cashless transactions as a result of the expansion in FinTech products such as e-wallets. The purpose of this study is to analyse key determinants of consumers' behaviour in selecting and adopting e-wallet services across Indonesia by integrating TAM and UTAUT models for explaining the underlying significant factors. This research was carried out using SEM by applying two-step approach involving measurement model for reliability test, convergent validity and discriminant validity; as well as structural model for path analysis to determine causal relationships between factor constructs. The findings revealed that behavioural intention, perceived ease of use, performance expectancy and facilitating conditions have significant influence on actual usage of e-wallet services. Additionally, simplicity in setting up account is discovered to be a significant aspect that contributes positively towards perceived ease of use. The present study also provides resourceful implications for e-wallet stakeholders to better enhance current digital payment system, as well as assisting policymakers to develop strategies/frameworks in facilitating cashless society.

## 1 Introduction

As technology has undergone a rapid revolution driven by the ubiquitous availability of internet connection as well as the vast potential usage of mobile devices, many industries have also experienced transformations on ways to offer their products/services including the financial sector. One example is the proliferation of digital payment applications such as mobile electronic wallets (e-wallets) which is a synchronisation between wireless communication, mobile devices as well as the banking system (Kazan *et al.*, 2018). Utilisation of such technology has proven to be of significant values for financial industry to strengthen the relationships between customers and businesses through innovative ways of interacting (Saura, Palos-Sanchez and Blanco-González, 2019). Several benefits that are being sought from adopting e-wallets as a payment service include greater accessibility towards financial services for all levels of the society, cost-effectiveness as well as time-efficiency (Milian, Spinola and de Carvalho, 2019).

Mobile payment services as a result of growing flexibility in the payment system, might offer substantial benefits for businesses and consumers to shift from the conventional usage of paper money (Sharma *et al.*, 2018). Nonetheless, with the developments of technology to have gradually supported the implementation of sophisticated e-wallets for financial sector to perform more effective and efficient transactions, equality has not been spread accordingly across some areas of Indonesia as a developing country (Tohang, Ramadhan and

Djajadiningrat, 2021). Indonesia is currently still at the infancy stage of FinTech adoption whereby according to Riyanto *et al.* (2018), conventional banking industry in Indonesia might be faced with considerable challenges in offering such financial services that are integrated with advanced technology and to be tailored for the needs of Indonesian society. Kang (2018) states that many consumers are concerned with confidentiality and privacy of their information when performing financial transactions through these technologies, which then became one of the contributing factors towards low adoption rate of e-wallet services. Furthermore, Bagla and Sancheti (2021) also identified several aspects of e-wallet that are deemed to be unsatisfactory by consumers, and thus requires immediate steps to be taken for improving the current mobile payment services as well as mitigating potential sustainability issue for such technological application. These low-performing areas consist of easy-to-use interface, wide acceptability as well as values that being are conferred from using such payment services.

The relative significance of various features considered by consumers for adopting and selecting e-wallet services are yet to be effectively demonstrated in majority of the existing literatures (Singh, Sinha and Liébana-Cabanillas, 2020; Wahyudi and AmaSuyanto, 2020; de Luna *et al.*, 2019), particularly in Indonesia where there has been an increasing emergence of digital payment platforms in recent years (Malonda, Tulung and Arie, 2020). Moreover, there is still a lack of empirical evidence on relationships between factors such as perceived ease of use, perceived usefulness and facilitating conditions in influencing the usage of digital payment (Gupta, Yousaf and Mishra, 2020; Wang *et al.*, 2019). Nevertheless, behavioural intention as well as perceived value are also believed to be the key determinants of consumer's attitude in continuously using a product/service that is closely-associated with technologies (Alalwan, Dwivedi and Rana, 2017).

Therefore, this project aims at addressing the current research gaps in area of digital payment by proposing following research questions:

- RQ1.** *What aspects are considered to be 'ease-of-use' in the interface of a digital payment platform?*
- RQ2.** *To what extent do promotions and rewards influence the selection and adoption of e-wallet services?*
- RQ3.** *To what extent does security feature influence the selection and adoption of e-wallet services?*
- RQ4.** *To what extent does the selection and adoption of e-wallet services influence by the availability of supporting infrastructure?*

Two models will be integrated for providing insights towards these variable constructs, namely technology acceptance model (TAM) as well as unified theory of acceptance and use of technology (UTAUT). The following sections of this paper will present an extensive literature review on previous studies in relation to e-wallet services, research methodology, design specification, implementation, evaluation of the research outcomes, as well as conclusion and future work.

## 2 Related Work

### 2.1 The Emergence of E-wallet Services

In nowadays developed global economy, fintech start-ups and innovations can be widely come across with numerous significant fintech advancements have occurred in the past few years, especially within the financial industry of several developing nations such as Kenya, Africa, Pakistan, South Korea, Malaysia as well as Indonesia (Tan, Purba and Widjaya, 2019). As a country that possesses attractive banking industry in Southeast Asia, substantial number of financial institutions in Indonesia have administered their resources towards developing smartphone-based applications as the priority and starting point for digitalising financial services (Wahyudi and AmaSuyanto, 2020). A programme called ‘National Non-cash Movement’ was launched by Bank Indonesia in 2020 for encouraging the adoption of e-wallet services as part of realising a cashless society, and the central bank also stated that a rapid growth in digital payment system was evident for the last few years with some of the major e-wallet platforms being OVO, GoPay and ShopeePay (Pertiwi, Suprpto and Pratama, 2020). Simultaneously, around 53% of the world’s population have been identified to utilise online banking system and thus are connected globally in terms of international trading (GSMA, 2022). The wide availability of internet connection which then coupled with vast smartphone usage have since enabled a new form of electronic payment (e-payment) that offers real-time cashless settlement for facilitating consumers and businesses transactions.

An e-wallet functions similarly to that of a regular wallet, with the money being stored in digital form and having such technology or application implemented on a mobile device to provide greater flexibility (Aji and Adawiyah, 2021). Funds can be added into the e-wallet through several ways (such as debit card, credit card as well as online bank transfer) to be used as a payment alternative for purchasing products/services which ranges from daily groceries up to luxury items (Kazan *et al.*, 2018). Many financial institutions have started to extend their services towards supporting e-wallet in order to offer greater values and better customer experience, in which these digital payments are generally performed by scanning a QR code, through NFC (Near Field Communication) feature, or in-application interface (Karim *et al.*, 2020). Apart from handling payments, e-wallet also serves as a convenient channel for funds transfer between individuals or commonly known as P2P (peer-to-peer) transactions; as well as removing the needs of multiple payment cards through a smart card integration (Punwatkar and Verghese, 2018). Additionally, e-wallet creates a new dimension for more business opportunities through the instant and efficient settlement process without requiring any intermediary hence leading towards lower transaction costs in general (Riyanto *et al.*, 2018).

Research shows that market demand for e-wallet has been rising gradually as consumers and businesses nowadays are looking for time-efficient as well as cost-effective services to be leveraged for managing daily financial transactions (Bagla and Sancheti, 2021). A significant digitalisation of banking and financial industry could be observed in 2020 whereby the society was shifting towards using digital payments such as e-wallet services for coping with the pandemic situation (Tohang, Ramadhan and Djajadiningrat, 2021). The adoption of

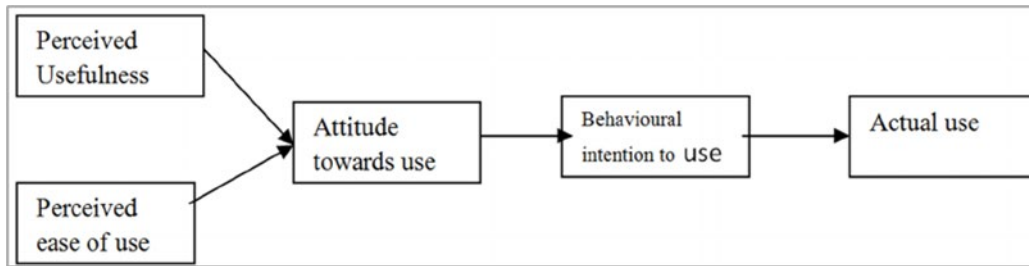
cashless payments has since then been increasing rapidly with the market size for e-wallet being projected to reach \$6.4 billion by the end of 2022, and is forecasted to further grow by 47% in 2025 (Singh, Sinha and Liébana-Cabanillas, 2020). Such ever-inclining trend for paperless payment system has thus influenced consumers' perspectives on e-wallet by enabling the concept of mobile payment services to be widely accepted as an alternative method of paying for goods and services (Shekhar, Manoharan and Rakshit, 2020).

As digital payment has inherently enhanced financial industry from the aspects of cost-efficiency as well as effort effectiveness, this may suggest that current business models are likely to be integrated with, or replaced by, such fintech transformation of providing services through mobile devices (Gomber *et al.*, 2018). Besides allowing for online payments to be performed instantly and at lower costs, mobile payment also provides greater financial inclusion and accessibility to various groups of the society (Gomber, Koch and Siering, 2017). Nonetheless, Kang (2018) states that some consumers still prefer conventional payment methods in terms of better security and confidentiality of information, even though such payment services are in certain extent limited by the institution's policies. Similar findings were demonstrated by Leong *et al.* (2021) in the study of mobile payment adoption among Malaysians in the Sarawak district; as well as Loh *et al.* (2021) which investigated the slow uptake of mobile payment system from switching intention (SI) point of view. Therefore, the present study aims at integrating two renowned frameworks namely technology acceptance model (TAM) and unified theory of acceptance and use of technology (UTAUT) for scrutinising the underlying significant factors that influence Indonesian consumers' behaviour in selecting and adopting e-wallet services.

## **2.2 Theoretical Framework**

### ***2.2.1 Technology Acceptance Model (TAM)***

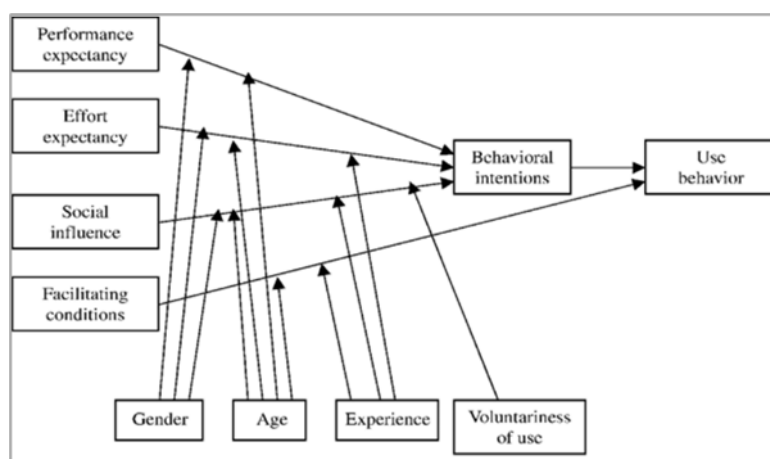
Technology acceptance model (TAM) was firstly brought up by Davis (1989) which is an incorporation between the theory of reasoned action (TRA) developed by Fishbein and Ajzen (1975) as well as theory of planned behaviour (TPB) by Ajzen (1991), where both are well-researched models that have been successfully implemented in various cases for analysing technology acceptance behaviour (Malonda, Tulung and Arie, 2020; Pertiwi, Suprpto and Pratama, 2020; Barry and Jan, 2018). TAM is one of the most widely applied theories for studying behavioural intention within the area of technological adoption, by reflecting upon perceived ease of use and perceived usefulness of a particular technology/system (Foroughi, Iranmanesh and Hyun, 2019). As mentioned by Sarmah, Dhiman and Kanojia (2021), TAM is well-recognised for academic researches within the scope of technological usage intention in which the variables of interest are generally associated with decisions in accepting new technology. Current existing literatures demonstrate that TAM has been greatly utilised for analysing the adoption of various innovations which ranges from information systems, short message services, m-commerce as well as e-learning (Gupta, Yousaf and Mishra, 2020; Thusi and Maduku, 2020). Nevertheless, TAM model has not been effectively utilised for conducting studies in the field of e-wallet services.



**Figure 1: Technology acceptance model (TAM) by Davis (1989).**

### 2.2.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

Unified theory of acceptance and use of technology (UTAUT) model was initially proposed by Venkatesh *et al.* (2003) based on the social cognitive theory which combined eight leading information technology (IT) acceptance research frameworks. The model postulates four factors (performance expectancy, effort expectancy, social influence and facilitating conditions) as direct determinants of use behaviour, along with four moderator variables (age, gender, experience and voluntariness). UTAUT has been cited in several literatures to be a suitable model for discovering significant determinants of technological adoption in relation to user's perception and behaviour (Soodan and Rana, 2020; Rosnidah *et al.*, 2019); and has emerged as the second most widely applied theoretical framework for analysing mobile payment adoption (Alalwan, Dwivedi and Rana, 2017). Given the substantial citations of UTAUT model in many scholarly works, a systematic review was carried out by Williams *et al.* (2011) for understanding the reasons, use and adaptation of such theory across various fields of study which then reveals that many researches utilised UTAUT in conjunction with other framework or external variables to effectively posit an argument. Hence, these findings support the adaptation of UTAUT as a suitable framework for conducting extensive studies on e-wallet services.



**Figure 2: UTAUT model by Venkatesh *et al.* (2003).**

## 2.3 Estimation of Factor Constructs and Hypotheses

### 2.3.1 *Behavioural Intention*

As asserted by Fishbein and Ajzen (1975), behavioural intention is determined as a course of actions that a person will perform in the future, by which is intended to be carried out within certain period of time. Since e-wallet has started to be accepted as an alternative form of payment across the world including Indonesia with a projection of financial technology to expand greatly in the coming years, several studies have depicted a positive and significant relationship between behavioural intention and new technology usage (Chawla and Joshi, 2019; Barry and Jan, 2018). Similar findings were also presented by Foroughi, Iranmanesh and Hyun (2019) where behavioural intention is demonstrated to positively and significantly affect the actual usage of new technology or system. Hence, the following hypotheses are formed:

***H<sub>0a</sub>*** : *There is no relationship between behavioural intention and actual usage of e-wallet services.*

***H<sub>1a</sub>*** : *There is a significant relationship between behavioural intention and actual usage of e-wallet services.*

### 2.3.2 *Perceived Ease of Use & Effort Expectancy*

Perceived ease of use can be referred to as the extent of effortless and simpleness perceived by an individual when utilising a certain technology or system (Davis, 1989). Many scholars have discovered that there is a positive and significant relationship between perceived ease of use and behavioural intention, which would then have effect towards consumer's behaviour in adopting new technology (Ariffin *et al.*, 2021; Punwatkarn and Verghese, 2018; Sharma *et al.*, 2018). In a research conducted by Al-Marouf and Al-Emran (2018) on undergraduates who perceived utilising web service technology as easy and user-friendly, the findings shown that perceived ease of use has a positive influence on behavioural intention to use information system, which is in accordance with most of the existing literatures. This particular factor is sometimes considered to have the greatest effect on acceptance of new technology (Gupta, Yousaf and Mishra, 2020).

On the other side, effort expectancy as a factor of UTAUT model is often associated with the level of ease presumed by an individual while using a technology (Venkatesh *et al.*, 2003). A study by Leong *et al.* (2021) on the acceptance of mobile payment services in Malaysia revealed that behavioural intention is positively influenced by effort expectancy. Therefore having a similar definition as perceived ease of use, both terms could be integrated for denoting an individual's perception on the level of convenience when employing a new technology or system. The following hypotheses are then developed based on above statements:

***H<sub>0b</sub>*** : *There is no relationship between perceived ease of use (effort expectancy) and behavioural intention to use e-wallet services.*

***H<sub>1b</sub>*** : *There is a significant relationship between perceived ease of use (effort expectancy) and behavioural intention to use e-wallet services.*



In another research by Navaretti *et al.* (2018), more than 40% of consumers who have utilised online financial services considered that simplicity in setting up an account constitutes towards part of interest for adopting such technology. Besides that, user interface design as well as easiness in navigating through the platform also serve as an important factor within this context-setting. Thus, the following hypotheses are proposed for this study:

***H<sub>0c</sub>*** : *There is no relationship between account setup and perceived ease of use in e-wallet services.*

***H<sub>1c</sub>*** : *There is a significant relationship between account setup and perceived ease of use in e-wallet services.*

***H<sub>0d</sub>*** : *There is no relationship between platform design & navigation and perceived ease of use in e-wallet services.*

***H<sub>1d</sub>*** : *There is a significant relationship between platform design & navigation and perceived ease of use in e-wallet services.*

### 2.3.3 Performance Expectancy

Performance expectancy is determined as the degree of benefits that an individual would receive from utilising a technology or system. An investigation by Hung and Luo (2019) on the usage of mobile commerce in Taiwan found that performance expectancy has a positive influence towards behavioural intention. In another study of analysing significant factors that affect the implementation of NFC-enabled mobile credit cards in Malaysia, similar findings were discovered whereby there is a positive relationship between performance expectancy and behavioural intention as the utilisation of this new technology has led to innovative marketing practices. Nevertheless, some studies have also come across mixed results for such relationship where performance expectancy is deemed to have negative impact towards behavioural intention, for instance within the context of e-government adoption in Korea as well as the United States (Im, Hong and Kang, 2020). Another research by Undi-Phiri and Phiri (2022) presents that even though performance expectancy is positively correlated to behavioural intention of adopting e-government in Qatar, the relationship is not significant. Hence, the following hypotheses are proposed based on above arguments:

***H<sub>0e</sub>*** : *There is no relationship between performance expectancy and behavioural intention to use e-wallet services.*

***H<sub>1e</sub>*** : *There is a significant relationship between performance expectancy and behavioural intention to use e-wallet services.*

### 2.3.4 Security & Privacy

Trust has been a key component of risk mitigation in online transactions which are commonly exposed to various uncertainties, as well as for enhancing customer loyalty (Sarkar, Chauhan and Khare, 2020). And thus one of the most challenging tasks in digital wallet services would have been maintaining trust among stakeholders, in which this is often associated with security and privacy protection provided by the e-wallet platform. According to Soodan and Rana (2020), privacy is described as an individual's ability to personally monitor and manage

self-relevant information; whereby security and privacy were depicted in several studies to be a suggestive factor which might affect e-wallet adoption.

Although e-wallet has been gaining substantial market tractions in recent years, there is still lack of knowledge and awareness within the security and privacy aspects (Karim *et al.*, 2020). As technology has been developing rapidly, users nowadays have become more concerned with security and privacy matter especially in relation to financial information such as disclosing card credentials for digital payments. Hence, individuals with minor or no experience in utilising financial technology might question the credibility of such payment services and would be unreluctant to perform transactions through e-payment unless security and privacy features are enhanced (Kang, 2018). The lack of security and privacy aspects have also been presented in a research by Malonda, Tulung and Arie (2020) as one of the issues which keeps consumers away from using digital payments, since this could potentially lead towards fraud and unauthorised access of personal information. Based on Barry and Jan (2018) findings, security and privacy are mentioned as an extended factor which has positive influence on behavioural intention to adopt new technology. The following hypotheses are formed based upon above mentioned literatures:

***H<sub>0f</sub>*** : *There is no relationship between security & privacy and behavioural intention to use e-wallet services.*

***H<sub>1f</sub>*** : *There is a significant relationship between security & privacy and behavioural intention to use e-wallet services.*

### ***2.3.5 Facilitating Conditions***

Facilitating conditions is addressed as the measure of supporting infrastructure that an individual believes to be adequate and made available for users in utilising a certain technology or system. The emergence of a comprehensive ecosystem has been highlighted as a key development for the current financial industry to synergise and enhance customer's value, as well as one of the contributing factors towards successfulness of fintech adoption (Jin, Seong, and Khin, 2020). Riyanto *et al.* (2018) also emphasises on the importance for financial institutions in Indonesia to shift their focus towards developing compatible environment for facilitating new fintech-enabled mode of service delivery such as e-wallet. This is further supported by Leong *et al.* (2021) and Loh *et al.* (2021) who discovered that the lack of essential infrastructure by service provider may discourage consumers from adopting and using e-wallet services. Thus, the following hypotheses are developed:

***H<sub>0g</sub>*** : *There is no relationship between facilitating conditions and actual usage of e-wallet services.*

***H<sub>1g</sub>*** : *There is a significant relationship between facilitating conditions and actual usage of e-wallet services.*

## 3 Research Methodology

### 3.1 Sample and Data Collection

A quantitative approach was taken for meeting the objective of this study, whereby electronic survey was selected as the research strategy since this form of data gathering is considered to be the most efficient and effective way for collecting relevant information based on previous similar works (Ariffin *et al.*, 2021; Bagla and Sancheti, 2021; Tohang, Ramadhan and Djajadiningrat, 2021). This research has purposively chosen Indonesian young adults as the target population who are within the age range of 18-39 years old since this particular category of the society includes both ‘Gen Y’ as well as ‘Gen Z’, which are more welcome towards advanced and complex digital developments such as e-wallet (Sarmah, Dhiman and Kanojia, 2021).

The particular questionnaire was developed using one of the most versatile online survey tools that possesses great efficiency for exporting the collected data by being integrated with other data analysis software (Leong *et al.*, 2021; Jin, Seong and Khin, 2020; Al-Marroof and Al-Emran, 2018). All items of the questionnaire were designed in English language and can be divided into two major parts, with ‘SECTION-A’ for collecting demographics information (i.e. age, gender and state of residence); as well as ‘SECTION-B’ for measuring all relevant variables with the majority using a five-point Likert scale (1 = “least favourable”, 5 = “most favourable”) and several checklist questions as adapted from previous related works (Aji and Adawiyah, 2021; Ariffin *et al.*, 2021; Kazan *et al.*, 2018). The online survey was then distributed between 23 June 2022 to 17 July 2022 via social media platforms which are familiar to Indonesian young adults. By considering cost and time effectiveness of the present study as well as maintaining safety measures that were still imposed post-pandemic, a non-probabilistic convenience sampling method was utilised for gathering the primary data of this research.

As there is no consensus on the minimum requirements of sample size for analysis involving structural equation modeling (SEM), the number of appropriate sample respondents was determined following a rule of thumb adapted from previous researches. According to Thusi and Maduku (2020), the suggested sample size should be 100 or larger with the ratio of observations to variables is 5:1 while some studies also cited to be 10:1 of the total measured items.

### 3.2 Data Analysis

The obtained dataset was initially pre-processed by transforming some of the measured variables into eight-point Likert scale, such as the frequency of utilising e-wallet services (1 = “Never”, 8 = “More than once a day”) as well as e-wallet usage behaviour based on the total number of different transaction types (1 = “Never used E-wallet to perform transaction”, 8 = “Seven or more types of transaction performed using E-wallet”). Afterwards, the data was checked for any missing values; as well as casting several variables as ‘factor’ data type which include age and gender. Descriptive statistics were then utilised to provide a distribution overview of the measured variables, along with carrying out exploratory data

analysis through plots/diagrams; and eventually respondents that do not meet the specified criteria as target sample for this study (i.e. between the age of 18-39) were filtered out to create a sub-sample for further part of the analysis.

Next step was to conduct confirmatory factor analysis (CFA) for measuring causal connections amongst the factor constructs or latent variables, whereby CFA is a hypothesis-testing method that is commonly used for specifying and testing a model which consists of one or more concepts built upon solid hypothetical and exact establishment from previous related works (Al-Maroofof and Al-Emran, 2018). Structural equation modeling (SEM), which is a combination of CFA with multiple regression analysis, was therefore chosen for analysing the structural relationships between measured variables and latent constructs (Al-Maroofof and Al-Emran, 2018). This was because SEM is deemed by existing literatures in social and behavioural sciences to be a suitable procedure for complex model testing, as well as the effectiveness of SEM capability in verifying both direct and indirect effects (Alalwan, Dwivedi and Rana, 2017).

### *3.2.1 Measurement Model*

Measurement model testing was carried out by appraising all items/indicators using reliability test as well as convergent validity and discriminant validity. A reliability test was performed for assessing the internal consistency based on Cronbach's  $\alpha$  and composite reliability (CR) whereby both scores are suggested to be greater than 0.70 (Saura, 2020). On the other hand, convergent validity was measured through average variance extracted (AVE) in which the score should be greater or equal to 0.50 (Hair *et al.*, 2019); and discriminant validity was examined by utilising Fornell-Larcker criterion with the factor loadings of each item should be higher than 0.70 as well as the square root of AVE should be greater than the correlations to corresponding factor (Chawla and Joshi, 2019).

### *3.2.2 Structural Model*

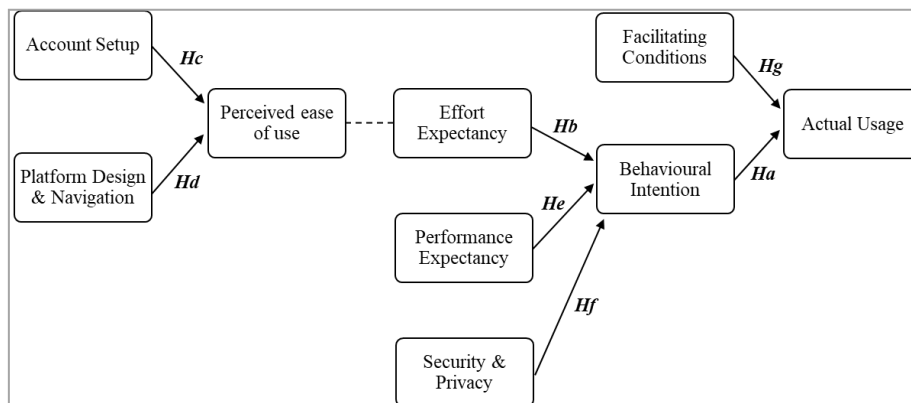
In structural model testing, causal relationships between factor constructs were evaluated using covariance-based structural equation modeling (CBSEM) as this particular technique is viewed to have attained notable results across various studies by assuming multivariate normal distribution (Rosnidah *et al.*, 2019). Both Mardia's test as well as E-statistics (energy) test were therefore performed on the dataset for checking multivariate normality before conducting CBSEM, whereby  $p$ -value  $> 0.05$  depicts that the variables follow a multivariate normal distribution (Jobst *et al.*, 2021). Furthermore, CBSEM has also been a well-established and entrenched procedure used by many scholars across different fields of study for measuring causal relationships of latent variables, including strategic administration as well as operations management (Stevens and Pituch, 2018). The explanatory power and significance of the structural model were addressed by  $R^2$  as well as  $t$ -statistic and  $p$ -value respectively, with  $R^2$  values of 0.75, 0.50 and 0.25 indicating substantial, moderate and weak levels of predictive capability (Hair *et al.*, 2019); as well as being significant with  $|t$ -statistic  $> 1.96$  and  $p$ -value  $< 0.05$  at 95% confidence level.

### 3.2.3 Goodness of Fit Tests

The model's goodness of fit was assessed using several metrics such as comparative fit index (CFI) and Tucker-Lewis index (TLI) where both values are suggested to be 0.95 or higher (Hair *et al.*, 2019); root mean square error of approximation (RMSEA) with a good fit being established at 0.08 or lower (Sarkar, Chauhan and Khare, 2020); as well as standardised root mean square residual (SRMR) with a value of 0.08 or lower being considered as acceptable for path analysis (Wang *et al.*, 2019).

## 4 Design Specification

As cited in Ariffin *et al.* (2021) that human behaviour towards accepting a new technology or system is depicted to be multi-faceted and complex, more than a single model or an integrated approach is generally taken for uncovering such relationship. The integration of two or more models would hence provide a more inclusive and wide-ranging view of the underlying causal mechanisms than a single model could have offered (Thusi and Maduku, 2020). Several existing literatures have successfully combined TAM and UTAUT for developing conceptual model to explain user's intention in adopting mobile catering apps, online banking services, as well as social media and network (Gupta, Yousaf and Mishra, 2020; Foroughi, Iranmanesh and Hyun, 2019). Therefore, both theories were fully synthesised in a complimentary manner for the present study to better understand what factors could have driven Indonesian consumers' intention to adopt e-wallet services by involving eight factor constructs as presented in Figure 3, with each arrow or path represents the hypothesised relationship between variables.



**Figure 3: Proposed research model based on the integration of TAM and UTAUT.**

## 5 Implementation

The obtained survey data was transformed and prepared for SEM analysis by initially acquiring a summary of the respondents' demographics profile. Afterwards, exploratory analysis was performed on the dataset by graphing the distributions of some measured variables. This enables for uncovering any potential relationship that may be hidden between

measured variables. SEM analysis was then conducted in two-step approach with firstly being measurement model testing that involved calculating Cronbach’s  $\alpha$  as part of reliability test. Since SEM requires the assumption of multivariate normality, both Mardia’s test and E-statistics (energy) test were employed for checking the measured variables’ distributions. And subsequently, the second phase of SEM analysis which involved structural model testing was carried out to ascertain the causal relationships between factor constructs. This produced a range of outputs that include several goodness of fit indices (Chi-squared, CFI, TLI, RMSEA and SRMR), factor loadings, covariances, estimate coefficients and standard errors for the path analysis,  $R^2$  and many more. In addition to that, the AVE for each latent variable was then extracted to be further utilised for convergent validity and discriminant validity tests. Lastly, the path analysis was plotted into a graph to provide a clear insight towards factors that significantly influence the adoption of e-wallet services.

## 6 Evaluation

### 6.1 Demographics Profile

Total collected responses of the survey distributed from 23 June 2022 to 17 July 2022 were 234, with majority of the sample consists of ‘Gen Z’ within the age range of 18-28 years old (56%), followed by ‘Gen Y’ who are between 29-39 years old (41%), and a few respondents that aged 40 years old or above (2%) as well as some which preferred not to disclose their age (1%). As presented in Table 1, the respondents’ profile is almost equally split between males (52%) and females (47%); and the sample is revealed to have predominantly comprised of respondents from ‘North Sumatra’ (29%), ‘Jakarta’ (10%), ‘West Java’ (9%), ‘Riau’ (7%), as well as ‘Bali’ (6%). Furthermore, some of the most widely adopted e-wallet platforms in Indonesia are shown to be OVO (68%), GoPay (60%), ShopeePay (54%) and DANA (50%).

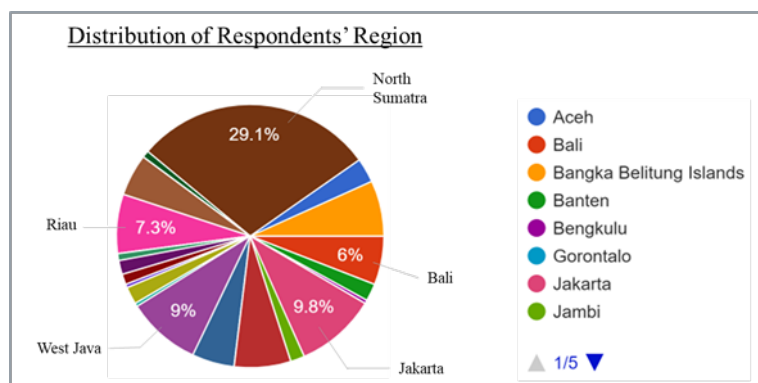


Figure 4: Respondents’ region overview.

**Table 1: Demographics profile**

Attribute	Items	Frequency	Proportion (%)
Age	18-28	130	55.6
	29-39	95	40.6
	40 or above	6	2.5
	Prefer not to say	3	1.3
Gender	Male	121	51.7
	Female	109	46.6
	Prefer not to say	4	1.7
Which E-wallet platform(s) have you ever used?	OVO	159	67.9
	GoPay	138	59.0
	ShopeePay	127	54.3
	DANA	116	49.6
	LinkAja	84	35.9
	Sakuku	56	23.9
	DOKU	53	22.6
	jenius	45	19.2
	Paytren	38	16.2
	i.saku	34	14.5
	TADA	19	8.1
	Others	5	2.1

## 6.2 Descriptive and Exploratory Data Analysis

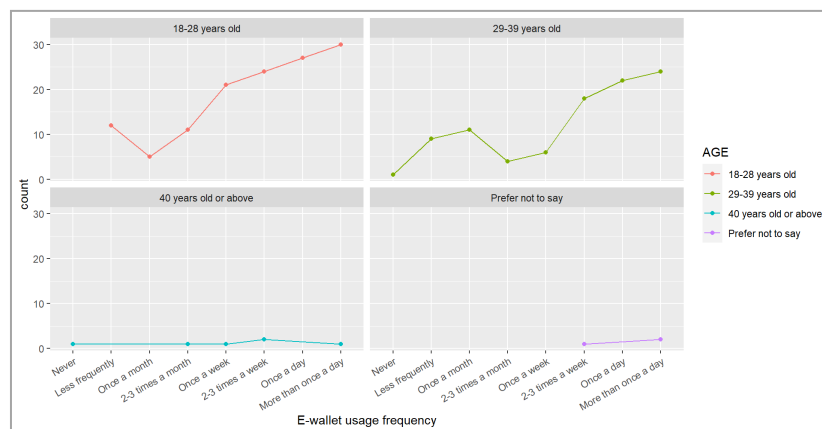
The following Table 2 provides descriptive statistics involving mean, standard deviation and factor loadings for each of the indicator/item, in which most of the variables measured using five-point Likert scale are depicted to possess a mean close to 3.80 indicating that respondents in general have a positive impression towards e-wallet from various aspects. In terms of standard deviation, majority of the indicators have a standard deviation of around 0.95 with only three items are shown to be greater than 1.00, which are SP4, BI1 and AU1 hence there is not much variability within each indicator as most data points are located around the mean.

**Table 2: Descriptive statistics**

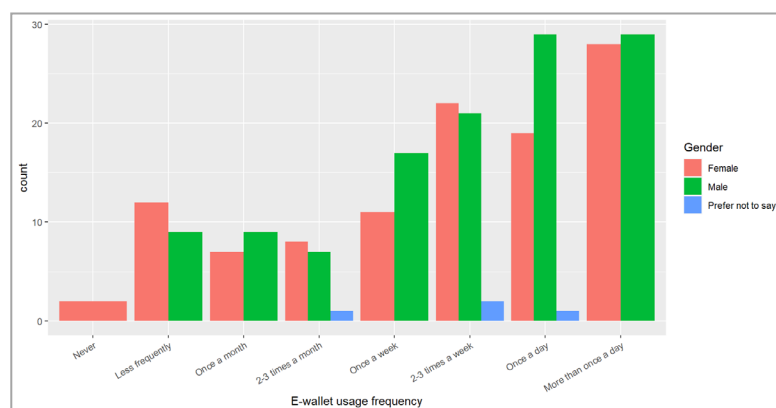
Latent Construct	Indicators	Mean	Std. Dev.	Standardised Factor Loadings
Account setup (AS)	AS1	3.91	0.94	0.717
	AS2	4.04	0.99	0.786
Platform design & navigation (DN)	DN1	3.79	0.93	0.873
	DN2	3.78	0.95	0.813
Perceived ease of use (EU)	EU1	4.09	0.98	0.747
	EU2	4.09	0.94	0.801
	EU3	3.88	0.96	0.693
Performance expectancy (PE)	PE1	3.80	0.98	0.805
	PE2	3.80	0.98	0.813

Security & privacy (SP)	SP1	3.92	0.96	0.731
	SP2	3.89	0.97	0.765
	SP3	3.89	0.93	0.743
	SP4	3.75	1.03	0.753
Facilitating conditions (FC)	FC1	3.88	0.96	0.692
	FC2	3.95	0.94	0.625
	FC3	3.85	0.99	0.592
Behavioural intention (BI)	BI1	5.83	1.96	1.00
Actual usage (AU)	AU1	4.36	1.90	1.00

Behavioural characteristics of the respondents were being observed through their frequency in utilising e-wallet services, whereby almost a quarter of the respondents (24%) stated that they used e-wallet as a mean of payment for more than once a day and followed by 20% who responded to have used e-wallet services at least once a day. This could therefore highlight the adoption of fintech such as e-wallet services have started to become an integral part in financial activities of the Indonesian society. And upon further exploratory data analysis, Figure 5 presents that ‘Gen Z’ seems to have tendency in utilising e-wallet as a payment method for daily financial transactions more often than ‘Gen Y’, with a noticeable spike for ‘Gen Y’ in using e-wallet services once a month. Furthermore, Figure 6 shows that female respondents tend to use e-wallet less frequently as compared to male respondents who in general have higher usage rate.



**Figure 5: Relationship between age and e-wallet usage frequency.**



**Figure 6: Relationship between gender and e-wallet usage frequency.**



### 6.3 Measurement Model

A reliability test was initially conducted for assessing internal consistency of the measurement model by utilising both composite reliability (CR) as well as Cronbach’s  $\alpha$ . The results in Table 3 demonstrate that approximately all factor constructs have good reliability with the lowest value being 0.672 for CR and 0.718 for Cronbach’s  $\alpha$ , in which are close to or above the suggested value of 0.70 (Saura, 2020). Afterwards, convergent validity was carried out for measuring the degree to which several items converge at a specific factor through analysing the average variance extracted (AVE); whereby Table 3 depicts that the values of AVE are ranged between 0.406 and 1.00 therefore indicating sufficient validity with only one factor is below the suggested minimum value of 0.50 (Hair *et al.*, 2019). And discriminant validity was eventually performed for evaluating the extent to which a factor construct is statistically different (uncorrelated) and distinct from each other. This was determined by following the Fornell-Larcker criterion, where Table 2 shows that majority of factor loadings are higher than the suggested value of 0.70; and the square root of AVE for each factor (presented diagonally and bold in Table 3) is mostly greater than the correlations to corresponding factor (Chawla and Joshi, 2019). Hence, the model can be concluded to have met the criteria for adequate discriminant validity.

**Table 3: Reliability test, Convergent validity and Discriminant validity**

	<i>Cronbach's <math>\alpha</math></i>	<i>CR</i>	<i>AVE</i>	AS	DN	EU	PE	SP	FC	BI	AU
AS	0.712	0.722	0.569	<b>0.754</b>							
DN	0.829	0.831	0.711	0.687	<b>0.843</b>						
EU	0.775	0.792	0.559	0.832	0.661	<b>0.748</b>					
PE	0.825	0.791	0.654	0.636	0.589	0.555	<b>0.809</b>				
SP	0.837	0.836	0.560	0.766	0.685	0.664	0.645	<b>0.748</b>			
FC	0.718	0.672	0.406	0.835	0.734	0.722	0.834	0.844	<b>0.637</b>		
BI	1.00	1.00	1.00	0.056	0.021	0.131	-0.104	-0.009	-0.027	<b>1.00</b>	
AU	1.00	1.00	1.00	0.130	0.100	0.154	0.050	0.098	0.108	0.497	<b>1.00</b>

### 6.4 Structural Model

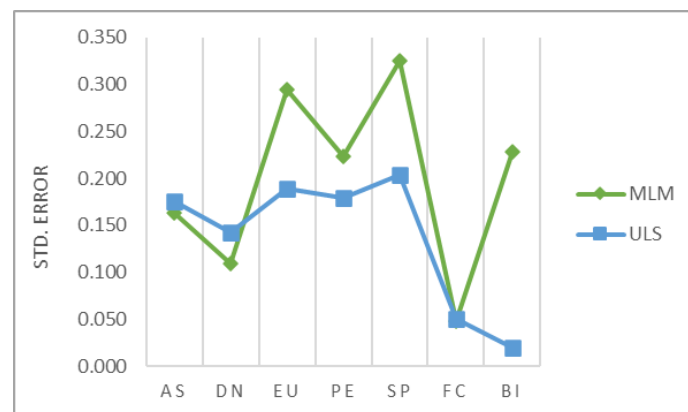
As a preliminary step for carrying out SEM analysis which assumes multivariate normal distribution, both Mardia’s test and E-statistics (energy) test were performed on the dataset for assessing multivariate normality. The analysis results then suggest that the data did not follow a multivariate normal distribution as both tests’  $p$ -value are below 0.05 (Jobst *et al.*, 2021); and thus two estimators that are robust towards non-normality were selected for comparison in conducting the SEM analysis which involved maximum likelihood variant (MLM) and unweighted least squares (ULS).

As for testing the model’s goodness of fit, several indices were produced from the SEM analysis using both estimators as presented in Table 4. The findings depict that both models’ metrics are within the recommended thresholds of CFI & TLI > 0.95 (Hair *et al.*, 2019); RMSEA < 0.08 (Sarkar, Chauhan and Khare, 2020); SRMR < 0.08 (Wang *et al.*, 2019),

therefore indicating appropriate model fit. Nonetheless, the ULS method exhibits superior values for all indices hence implying better fit as compared to the MLM estimator. Furthermore, overall standard errors for the regression were also observed to be lower and stable in ULS model than MLM as pictured in Figure 7; hence the ULS estimator was deemed to have yield more accurate results based upon both arguments and was therefore chosen for further interpretation of path analysis.

**Table 4: Goodness of fit indices**

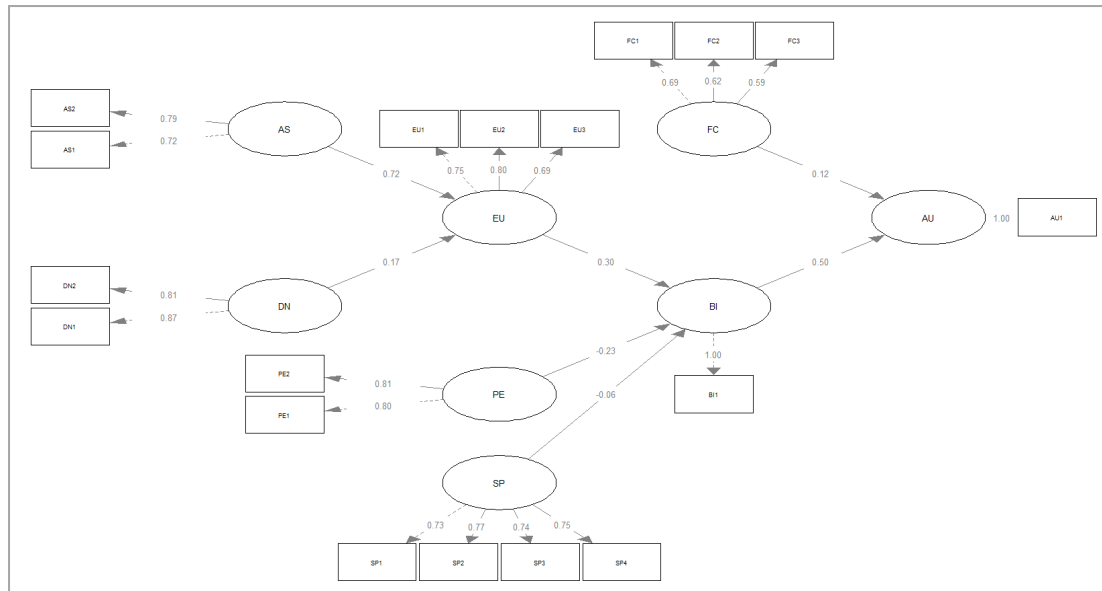
	Maximum Likelihood (MLM)	Unweighted Least Squares (ULS)
Comparative Fit Index (CFI)	0.976	1.000
Tucker-Lewis Index (TLI)	0.970	1.001
RMSEA	0.380	0.000
90% CI - lower	0.017	0.000
90% CI - upper	0.054	0.030
p-value	0.944	1.000
SRMR	0.048	0.045



**Figure 7: Comparison of standard errors between MLM and ULS.**

Figure 8 and Table 6 illustrate the standardised path coefficient ( $\beta$ ),  $t$ -statistic and  $p$ -value for each hypothesis with the analysis results showing that five out of the seven hypotheses are found to be significant.  $H_a$  ( $\beta= 0.501$ ,  $t= 24.200$ ) which describes the path between behavioural intention (BI) and actual usage (AU), exhibits a positive and significant relationship among both factors.  $H_b$  ( $\beta= 0.299$ ,  $t= 4.217$ ) representing a positive and significant relationship between perceived ease of use (EU) and behavioural intention (BI) to use e-wallet services.  $H_c$  ( $\beta= 0.716$ ,  $t= 4.469$ ) refers to the path between account setup (AS) and perceived ease of use (EU), is demonstrated to have a positive and significant relationship.  $H_d$  ( $\beta= 0.170$ ,  $t= 1.070$ ) explains that perceived ease of use (EU) is positively influenced by platform design & navigation (DN), however the relationship is not significant.  $H_e$  ( $\beta= -0.233$ ,  $t= -3.251$ ) shows performance expectancy (PE) has a negative impact as well

as being significant towards behavioural intention (BI).  $Hf$  ( $\beta = -0.058$ ,  $t = -0.794$ ) depicts that there is an insignificant negative relationship between security & privacy (SP) with behavioural intention (BI) to adopt e-wallet services. Lastly,  $Hg$  ( $\beta = 0.122$ ,  $t = 6.882$ ) represents a positive and significant relationship associated between facilitating conditions (FC) and actual usage (AU) of e-wallet services.



**Figure 8: Diagram of the path analysis results.**

The results of  $R^2$  in Table 5 demonstrate that 70.8% of the variation in perceived ease of use (EU) can substantially be explained by the two factors of AS and DN. However, the  $R^2$  for both behavioural intention (BI) as well as actual usage (AU) are considered to be low at 6.4% and 26.2% respectively. These imply weak explanatory power of BI by EU, PE and DN; as well as for AU that is explained by BI and FC.

**Table 5: R-squared of endogenous variables**

Latent Variable	R-squared
Perceived ease of use (EU)	0.708
Behavioural intention (BI)	0.064
Actual usage (AU)	0.262

## 6.5 Discussion

The present study has discovered several factors that influence Indonesian consumers' behaviour in selecting and adopting e-wallet services, starting with behavioural intention which maintains a positive and significant influence towards actual usage of e-wallet services as demonstrated in several previous researches (Chawla and Joshi, 2019; Foroughi, Iranmanesh and Hyun 2019; Barry and Jan, 2018). This means the willingness to operate fintech as part of realising a cashless society has thus influenced Indonesian consumers to adopt and integrate e-wallet services in their daily financial transactions, with most of the respondents have utilised this form of alternative payment more than once a day.

Perceived ease of use is highlighted to have positive and significant impact on behavioural intention in alignment with the findings by Ariffin *et al.* (2021), Al-Marroof and Al-Emran (2018); Punwatar and Verghese (2018), as well as Sharma *et al.* (2018); meaning that Indonesian society has the intention to use e-wallet services because of minimal effort required and convenience in performing financial transactions through such payment method. Moreover, simplicity in setting up account is found to be a significant aspect/factor that contributes positively towards perceived ease of use in e-wallet services as depicted by Navaretti *et al.* (2018). Besides that, platform's design which enables for straightforward navigation and equipped with clear instructions also have a positive impact on perceived ease of use, even though this particular aspect may not be significant.

In contrast with Hung and Luo (2019) discovery, the findings of this study demonstrate that performance expectancy has significant negative influence on behavioural intention to adopt e-wallet services; whereby some of the previous researches have also come across mixed results such as in Im, Hong and Kang (2020). Benefits received by consumers from utilising such payment vehicle were measured through the attractiveness of promotions & rewards being offered, hence this may imply that there are others more sought-after gains being considered by the Indonesian society for adopting e-wallet services. Additionally, security & privacy aspect is depicted to be an insignificant factor which negatively affects behavioural intention to use e-wallet services as opposed to the findings in Malonda, Tulung and Arie (2020) as well as Kang (2018).

And eventually, facilitating conditions has a positive and significant influence on actual usage of e-wallet services in accordance with previous studies (Leong *et al.*, 2021; Loh *et al.*, 2021; Jin, Seong, and Khin, 2020; Riyanto *et al.*, 2018); in which the availability of necessary resources and supporting infrastructure are crucial towards the successfulness of fintech adoption in Indonesia including e-wallet services. The analysis shows that some of the key aspects being involved are level of acceptance and compatibility of e-wallet as a mean of payment, as well as the degree of assurance provided by government and relevant authorities towards e-wallet as a payment service.

**Table 6: Results of proposed model**

Hypothesis	Path	$\beta$	<i>t-statistic</i>	<i>p-value</i>	Decision
<i>Ha</i>	BI → AU	0.501	24.200	0.000	Reject $H_0$
<i>Hb</i>	EU → BI	0.299	4.217	0.000	Reject $H_0$
<i>Hc</i>	AS → EU	0.716	4.469	0.000	Reject $H_0$
<i>Hd</i>	DN → EU	0.170	1.070	0.286	Do not reject $H_0$
<i>He</i>	PE → BI	-0.233	-3.251	0.001	Reject $H_0$
<i>Hf</i>	SP → BI	-0.058	-0.794	0.429	Do not reject $H_0$
<i>Hg</i>	FC → AU	0.122	6.882	0.000	Reject $H_0$

## 7 Conclusion and Future Work

The objective of this study is to identify important determinants that influence consumers' behaviour in selecting and adopting e-wallet services across Indonesia. The research outcomes revealed that five out of the seven hypotheses are significant, which means the likelihood of Indonesian consumers in selecting and adopting e-wallet services can mostly be defined by behavioural intention, perceived ease of use, performance expectancy as well as facilitating conditions. In addition to that, simplicity in setting up account for e-wallet services is discovered to be a significant aspect which positively contributes towards perceived ease of use. E-wallet platform's design that enables for straightforward navigation is also found to have positive influence towards perceived ease of use, even though the effect may not be significant. In terms of benefits received by the consumers through promotions and rewards offered by such payment alternative, this factor is depicted to be at odds with consumers' intention in adopting e-wallet services. On the other hand, security & privacy feature is described to be insignificant towards the intention for adopting e-wallet services. Nonetheless, the availability of supporting infrastructure is demonstrated to be a significant determinant of e-wallet adoption which revolves around the level of acceptance and assurance given to e-wallet as a payment service.

These findings would theoretically contribute towards digital payment research by strengthening current literatures on FinTech adoption through refined TAM and UTAUT models, as only few studies have attempted to explore and gauge the adoption of e-wallet services within Indonesia demographic. As from practical aspect, this would provide resourceful implications for stakeholders of digital payment services to better enhance e-wallet system by understanding which crucial features to be included during the product/service development process in reference to consumers' needs and wants. Besides that, this research could also potentially assist policymakers to develop appropriate strategies/frameworks for supporting e-wallet services and facilitating Indonesian government's vision towards a cashless society.

Although the present study might shed upon inclusive insights of factors which significantly influence e-wallet adoption in Indonesia, the research cannot be stated free from limitations. As the primary data was gathered through online survey, individuals from rural areas may encounter barriers to internet connectivity and might not be captured in the sample. Furthermore, the survey respondents were not equally distributed across every region in Indonesia, and thus the overall findings may not be representative of the entire Indonesia population. Some other limitations might involve the chosen convenience sampling technique that may result in biased outcomes; as well as the findings may vary across other nations and generations due to different e-wallet systems and cultural behaviour. Nevertheless, this has laid down profound opportunities for future researches of e-wallet adoption to observe from demographically different perspectives; utilising another approach of data gathering through interview and open-ended questions for greater qualitative insights; as well as leveraging on other indicators to enhance overall model robustness and using estimators such diagonally weighted least squares (DWLS) to conduct the SEM analysis.

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