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Exploring Mobile Wallet Adoption in Indonesia Using UTAUT2

An Approach from Consumer Perspective

Simon Megadewandanu

Master of Information Technology
Universitas Atma Jaya Yogyakarta
Yogyakarta, Indonesia
simonndanu@gmail.com

Suyoto

Master of Information Technology
Universitas Atma Jaya Yogyakarta
Yogyakarta, Indonesia
suyoto.uajy@gmail.com

Pranowo

Master of Information Technology
Universitas Atma Jaya Yogyakarta
Yogyakarta, Indonesia
pran@mail.uajy.ac.id

Abstract—In past few years, mobile wallet took spotlight as alternative of existing payment solution in many countries such as USA, South Korea, Germany and China. Although considered as one of the most convenient payment, mobile wallet only claimed 1% from total electronic payment transaction in Indonesia. The aim of this study is to identify the behavior and user acceptance factors of mobile wallet technology. Online survey was conducted among 372 respondents to test hypothesis based on UTAUT2 model. Respondents consisted of 61.29% of male and 38.71% of female with age proportion was dominated by age group of 20's of 78.76%. In addition, 50.81% of respondents never used mobile wallet before and 49.19% of respondents have ever used mobile wallet. Data obtained were confirmed using confirmatory factor analysis and analyzed using structural equation model. The study found that habit was the factor that most strongly affected individual behavioral intention to use mobile wallet in Indonesia, followed by social influence, effort expectancy and hedonic motivation. The findings of this research for management can be used as consideration for making product decision related to mobile wallet. Further study is needed, as mobile wallet is still in early stage and another factor beside UTAUT2 should be considered in the study.

Keywords—mobile wallet; user adoption; UTAUT2

I. INTRODUCTION

The number of e-Commerce and m-Commerce transactions have increased massively in recent years [1] as well as the number of smart phone users around the world [2]. Mobile device is predicted to play big part of payment mix in the market reaching 85% of total global household consumption [3]. In addition, mobile phones can be equipped to add security like NFC, QR and OTP capabilities or can be used to transform how people do such as paying bills, buying tickets, and interacting friends or customers [4, 5].

On top of that, mobile wallet is one of the most convenient payment facilities. Ease of shop preparation without carrying physical cash, which at times can be discharged in the middle of the activity, can be obtained. Although mobile wallet has already been widely adopted in some countries like China, Germany [6], United States and South Africa [7], developed countries including Indonesia less likely adopt it.

According to data obtained from the Indonesian Internet Service Provider Association (APJII) & Puskakom UI on a survey of Internet users profile Indonesia in 2014, the total users who adopted electronic transaction methods were only 24% from the total active users of internet in Indonesia. SMS banking for transfer activities appeared to be the first choice for Indonesian people as much as 67.4%, followed by Internet banking (33%) and credit card (24%). In contrast, T-Cash and Dompotku XL which were categorized as mobile wallet, only claimed 0.8% and 0.2% respectively [8]. From this white paper, it shows that mobile-based payment method particularly mobile wallet may not have been so popular or well known by the people of Indonesia even though in fact 84% of Indonesian access internet from their mobile phones.

Even though there are many research about consumer adaption for m-banking and m-payment [9, 10, 11, 12, 13], the specific research about mobile wallet adoption is still less [14, 15, 16]. Therefore, this study will not only help banks to understand the adoption of mobile wallet or extend both their m-banking and m-payment product to the next level, but also help other companies such as telecommunication companies, retail industries or financial technology startups to build compelling mobile wallet and reach biggest potential of mobile wallet.

II. LITERATURE REVIEW

The literature review is used to figure out and identify the determinants variables and models in this study. Determinant variables and models will be used as references to arrange questionnaire for Indonesian people. This study has used model of UTAUT2.

Unified Theory of Acceptance and Use of Technology (UTAUT) is a model which is based on the basic theory of the behavior of users of the technology and models of user acceptance of the technology developed earlier. This model was proposed by Venkatesh et al. in 2003 [17]. This model consists of four variables as factors that determine the purpose and use of information technology; they are: 1) performance expectancy, 2) effort expectancy, 3) social influence and 4) facilitating conditions. In addition, this model also consists of

four variables as moderator between the determinants of the purpose and use of information technology, namely age, gender, experience and volunteerism. Then in 2012 Venkatesh et al. suggested the development of UTAUT to UTAUT2 by adding three determinants which are hedonic motivation, price value, the habit of interest and the use of information technology, by focusing on three moderator variables which are age, gender and experience [18]. This study used UTAUT2, as it includes acceptance and usage models (adoption) of latest information technology that have been tested and validated in previous studies.

Similar study that has been done is research by Slade et al. on model development UTAUT2 to explore the adoption of mobile payment customers in the UK. The development was added to two determinant variables, that was trust and perceived risk to the model approach of UTAUT2 [10].

Research to build trust and adoption of mobile money in areas with less reliable infrastructure (the area is Malawi) was conducted by Unyolo. Unyolo replaced the two default variables UTAUT2, Hedonic Motivation and Habit, became Infrastructure Reliability and Trust [15].

There is also research on comparison of the adoption of internet banking between the developed and developing countries. The variables tested are Performance Expectancy, Anxiety, Perceived Credibility, Social Influence, Attitude toward Using Internet Banking Service, Facilitating Conditions and Self-Efficacy. The research was conducted by Yuen et al. on 2010 [19].

In 2009, Al-Qeisi analyzed the use of UTAUT for explaining Internet banking adoption. Al-Qeisi modified UTAUT model by adding the quality of internet banking website design [20].

Research of identifying wallet phone rejection was conducted by Swilley in 2010. Swilley used TAM for finding the correlation of adoption factors [14].

This research used UTAUT2 model because it includes models of acceptance and use of the latest information technology that have been tested and validated in previous studies. Moreover, UTAUT2 is model that comes from union of many theories of acceptance and use of technology namely Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivation Model (MM), Theory of Planned Behavior (TPB), Combined TAM and TPB (C-TAM-TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT) and Social Cognitive Theory (SCT).

III. HYPOTHESIS DEVELOPMENT

A. Performance expectancy

Performance Expectancy is the degree to which a person believes that using a system will improve his/her job performance [17]. In mobile wallet context, performance expectancy can be referred to how it can give consumer advantages over other payment methods. In addition, Venkatesh et al. argues that performance expectancy is the most influential determinant of technology adoption. Prior empirical studies in mobile payment adoption [21] and mobile

banking adoption [11, 9] showed that behavioral intention is greatly influenced by performance expectancy. Thus, this study proposed:

H1: Performance expectancy significantly affects individual intention to use mobile wallet.

B. Effort Expectancy

Effort Expectancy is the degree to which a person will be able to use a system effortlessly [17]. Consumer will be showed more willingness to use mobile wallet if mobile wallet is easy to use. In addition, consumer will be started to judge whether the mobile wallet is easy or not from the registration procedures. Yu [11] and Slade et al. [21] showed that effort expectancy significantly affects to behavioral intention. Therefore, this study proposed:

H2: Effort expectancy significantly affects individual intention to use mobile wallet.

C. Social Influence

Social Influence is a factor about a person's perception toward most people who are important to him/her who think he/she should or should not use a particular system [17]. In real life, people have tendency to gather more information from other people related to a product. In mobile wallet context, consumer showed more willingness if more people recommend the mobile wallet especially those who are important to him/her. Prior studies showed that social influence played as important factors that affect behavioral intention toward mobile banking [21] as well as mobile payment [11]. This study proposed:

H3: Social influence significantly affects individual intention to use mobile wallet.

D. Facilitating Conditions

Facilitating Conditions is the degree to which a person believes that an existing infrastructure will support him/her to use a system [22, 17]. Previous empirical studies on various mobile technology adoption showed that behavioral intention is significantly influenced by facilitating conditions [21, 11]. Furthermore, Nisha et al. [9] showed that facilitation conditions have greater influence than performance expectancy and other factors to behavioral intention. Hence, this study proposed:

H4: Facilitating condition significantly affects individual intention to use mobile wallet.

E. Hedonic Motivation

Hedonic Motivation is the degree to which a person gets pleasure from the technology he/she uses [23]. Furthermore, Venkatesh et al. [18] stated that people not only care about its performance but also its feeling that is created from it and found that hedonic motivation is the second strongest factors affecting behavioral intention toward technology adoption. In some mobile adoption studies, Yu [11], Slade et al. [21], Nisha et al. [9] found that hedonic motivation is empirically proved has significant effect toward behavioral intention. Thus, this study proposed:

H5: Hedonic motivation significantly affects individual intention to use mobile wallet.

F. Price Value

Price value is about a person's perception of the cost he/she spends to use a system toward its perceived benefits [24]. When the advantage is greater than its cost, consumers showed more willingness to adopt particular technologies as well as mobile wallet [18]. The Investigations related to relationship between price value and behavioral intention had been done in some previous studies related to mobile adoption [21, 11]. Thus, this study proposed:

H6: Price value significantly affects individual intention to use mobile wallet.

G. Habit

Habit is the degree to which a person tends to perform behavior as an effect of learning [25, 18]. For distinct between experiences, habit is formed from prior experiences [26, 27]. Furthermore, when the habit is increasing, other factors will become less important [25]. Empirical findings from previous studies showed that habit significantly affects individual behavioral intention to use mobile technology such as mobile banking [21] and mobile payment [11]. Hence, this study proposed:

H7: Habit significantly affects individual intention to use mobile wallet.

IV. METHODOLOGY

Online survey via google form was chosen to gather the data required effectively and efficiently. This survey method was preferred because it is compatible with Indonesia environment where most Indonesian people have Internet access [8]. In addition, online survey provides convenient validation facilities that ensure all respondents to complete all questions without errors [28]. Thus, all data collected was validated and usable for data analysis, yielding a response rate of 100%. The sample of this study was Indonesian people who actively use smartphone and 372 respondents were randomly chosen. To ensure that respondents were able to answer all the questions more accurately, an explanation video related to mobile wallet was provided in first page of questionnaire.

The questionnaire is divided into two parts. The questions in the first part were asked about respondent's demographic information. In the second parts, a total of 26 questions which representing 8 factors of UTAUT2 were asked using 5 Likert scale. The questions can be seen in Table I.

TABLE I. QUESTIONNAIRE

Factor	Item	Question
Performance Expectancy	PE1	I find mobile wallet useful in my daily life.
	PE2	Using mobile wallet helps me accomplish things more quickly.
	PE3	Using mobile wallet increases my productivity.
Effort Expectancy	EE1	Learning how to use mobile wallet is easy for me.

	EE2	My interaction with mobile wallet is clear and understandable.
	EE3	I find mobile wallet easy to use.
	EE4	It is easy for me to become skillful at using mobile wallet.
Social Influence	SI1	People who are important to me think that I should use mobile wallet.
	SI2	People who influence my behavior think that I should use mobile wallet.
	SI3	People whose opinions that I value prefer that I use mobile wallet.
Facilitating Conditions	FC1	I have the resources necessary to use mobile wallet.
	FC2	I have the knowledge necessary to use mobile wallet.
	FC3	Mobile wallet is compatible with other technologies I use.
	FC4	I can get help from others when I have difficulties using mobile wallet.
Hedonic Motivation	HM1	Using mobile wallet is fun.
	HM2	Using mobile wallet is enjoyable.
	HM3	Using mobile wallet is very entertaining.
Price Value	PV1	Mobile wallet is reasonably priced.
	PV2	Mobile wallet is a good value for the money.
	PV3	At the current price, mobile wallet provides a good value.
Habit	HT1	The use of mobile wallet has become a habit for me.
	HT2	I am addicted to using mobile wallet.
	HT3	I must use mobile wallet.
Behavioral Intention	BI1	I intend to continue using mobile wallet in the future.
	BI2	I will always try to use mobile wallet in my daily life.
	BI3	I plan to continue to use mobile wallet frequently.

Table II summaries the demographic characteristics of the respondents. 61.29% of the respondents were male and 38.71% of respondents were female. Age was divided into 5 groups and the proportion of age was dominated by age group of 20's of 78.76%. In addition, 50.81% of the respondents never used mobile wallet before and 49.19% of the respondents have ever used mobile wallet.

TABLE II. DEMOGRAPHIC OF THE RESPONDENTS

Demographic		Frequency	Percent (%)
Gender	Male	228	61.29
	Female	144	38.71
Age	Below 20	17	4.57
	20-29	293	78.76
	30-39	45	12.10
	40-49	6	1.61
	50 or above	11	2.96
Used Mobile Wallet	Yes	183	49.19
	No	189	50.81

V. RESULT AND DISCUSSION

A. Measurement Model Assessment

The study used Confirmatory Factors Analysis (CFA) for testing the reliability and validity. All constructs, namely performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), hedonic motivation (HM), price value (PV), habit (HT) and behavioral intention (BI) were included. FC4 was dropped because its impact of standardized of regression weight value (item loading) was low (0.586), while the value of other items was more than 0.7. Table III is the model-fit indices which is based on standard or threshold value of goodness of fit in AMOS and the criterion cut-off used for evaluating the goodness-of-fit relative to the observed data [29, 30, 31].

TABLE III. THE MODEL-FIT INDICES

	χ^2/DF^a	GFI ^b	AGFI ^c	TLI ^d	CFI ^e	RMSEA ^f
Fit Indices	≤ 3	≥ 0.9	≥ 0.8	≥ 0.9	≥ 0.9	≤ 0.08
CFA Model	2.061	0.902	0.869	0.965	0.972	0.053
Structural Model	2.073	0.902	0.869	0.964	0.971	0.054

^a normed chi-square, ^b goodness-of-fit, ^c adjusted goodness-of-fit, ^d tucker-lewis index, ^e comparative fit index, ^f root mean-square error of approximation

B. Structural Model Assessment and Hypotheses Testing

Based on Table IV, the model proposed in this study was reliable. The research used the attributes of factor loading for the convergent validity. The recommendation for standardized factor loading value was 0.70 or higher [30]. Hence, FC4 was dropped. Average variance extracted (AVE) of each constructs were arranged between 0.667 and 0.897 that indicating good convergence (at 0.50 or higher) [30]. Furthermore, reliability value of all construtor or construct reliability (CR) was above 0.80 which means they represent the same latent construct consistently.

TABLE IV. STANDARDIZED ITEM LOADING, AVE, CR

Factor	Item	Standardized Item Loading	AVE	CR
Performance Expectancy	PE1	0.888	0.831	0.936
	PE2	0.933		
	PE3	0.913		
Effort Expectancy	EE1	0.859	0.746	0.921
	EE2	0.907		
	EE3	0.875		
	EE4	0.810		
Social Influence	SI1	0.893	0.897	0.963
	SI2	0.984		
	SI3	0.962		
Facilitating Conditions	FC1	0.796	0.667	0.857
	FC2	0.882		
	FC3	0.768		
	FC4	0.586		
Hedonic Motivation	HM1	0.947	0.862	0.949
	HM2	0.960		
	HM3	0.876		

Price Value	PV1	0.755	0.712	0.881
	PV2	0.872		
	PV3	0.898		
Habit	HT1	0.861	0.700	0.874
	HT2	0.903		
	HT3	0.738		
Behavioral Intention	BI1	0.890	0.807	0.926
	BI2	0.887		
	BI3	0.918		

Table V shows the summary of standard error, critical ratio, probability and estimation of standard regression weights. All critical ratios (t-value) were less than twice of standard error value in absolute value which means acceptable. The estimated value shows the degree of regression weight and standardized regression weight. If the value is positive, it means the relationship is directly proportional. In contrast, if the value is negative, it means the relationship effect is inversely proportional. H2, H3, H5 and H7 have probability level of less than 0.05 and t-value of greater than 1.96 that means they are supportive or significant (S), while H1, H4 and H6 are not supportive or not significant (NS).

TABLE V. PATH COEFFICIENTS, T-VALUE, RESULT OF HYPOTHESIS

Hypothesis	Est. ^a	S.E. ^b	t-value	P ^c	S.Est. ^d	Rslt. ^e
H1 BI ← PE	-.011	.049	-.218	.828	-.011	NS
H2 BI ← EE	.136	.060	2.275	.023	.111	S
H3 BI ← SI	.112	.039	2.870	.004	.113	S
H4 BI ← FC	-.110	.060	-1.855	.064	-.093	NS
H5 BI ← HM	.145	.066	2.192	.028	.145	S
H6 BI ← PV	.073	.064	1.126	.260	.069	NS
H7 BI ← HT	.737	.069	10.635	***	.585	S

^a estimate, ^b standard error, ^c probability, ^d standardized estimate, ^e result,

The estimation of standard regression weight value also represents the total effect value that comes only from direct effect. Since only one dependent construct was tested, there was no indirect effect from this model which means the indirect effect value from each construct is zero. The summary and overall illustration of the result research model can be seen in Fig. 1.

To find the key factor that has big influence on consumer intention of using mobile wallet that fits in Indonesia environment, this study proposed hypothesis based on UTAUT2 model. Fig. 1 shows effort expectancy, social influence, hedonic motivation and habit had significant relationship to behavioral intention on mobile wallet adoption in Indonesia. In order, habit was the strongest factor that was significant affected with probability level of less than 0.001 (***), followed by social influence with probability level of less than 0.01, effort expectancy and hedonic motivation with probability level of less than 0.05. In contrast from the most insignificant order was performance expectancy, price value and facilitating conditions which had no significant relationship to behavioral intention on mobile wallet in Indonesia.

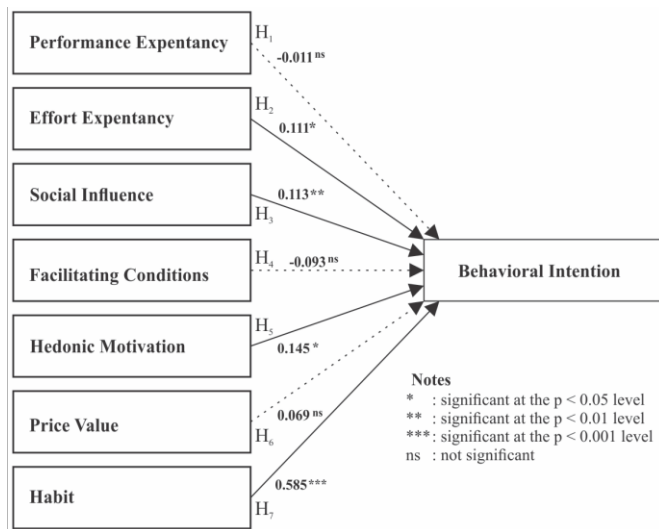


Fig. 1. Result summary of research model

Habit was to be found as the strongest factors affecting behavioral intention to use mobile wallet in Indonesia. This finding is consistent with some prior studies [32, 33]. As mentioned before, the penetration rate of mobile wallet in Indonesia is extremely low compared to others payment method such as cash, debit and credit [8], it can be seen that only early adopter is currently using mobile wallet. Industries should make habit of use mobile wallet in Indonesia as priority before anything else, only it can happen if people can use mobile wallet anywhere and everywhere naturally like the way how debit can be adopted successfully by people nowadays naturally.

Another strong factor that affected behavioral intention was social influence. This finding is consistent with previous studies [34, 9] and suggests that industries should ensure that early adopter in Indonesia is satisfied and only then they will recommend the use of mobile wallet to others. In cultural perspective, Indonesian people as an individual tends to seek recommendation from others [2]. Industries should have paid more attention word-of-mouth and the social media as Indonesia is one of countries with highest social media consumption [35].

Effort expectancy was also a factor that was found to affect behavioral intention to use mobile wallet in Indonesia. This finding is in line with prior studies [33, 15] and suggests that industries should make mobile wallet easy to use. For example, they should make registration procedures, top-up procedures, and function of the mobile wallet as simple as possible.

Hedonic motivation was another factor that was found significantly affecting behavioral intention to use mobile wallet. This finding is in line with past study [18]. Hence, this finding suggests that the design and the mechanism of mobile wallet as a system should not only focus on functionality but also on the user interface and user experience. Gamification concept can be utilized to increase consumer engagement within toward mobile wallet.

Interestingly, performance expectancy does not have significant affect toward behavioral intention. This finding is not align with Venkatesh et al. [18] finding and other numerous studies [9, 15] which found that performance expectancy has significant effect to behavioral intention. This finding occurred because mobile wallet is still at introduction stage of product life cycle, which most of user are early adopter. Those early adopters usually are people who buy or use new products for personal satisfaction, not because of the performance.

Price value did not significantly affect behavioral intention toward mobile wallet. This is contrast with findings in many previous studies [33, 36, 18]. It happened because people as the early adopters tend to use mobile wallet for fun, pride and their personal satisfaction. In this kind of situation, price value is not a concern for them.

Lastly, facilitating conditions did also not significantly affect behavioral intention to use mobile wallet. One of prior studies by Gaitan et al. also has similar result [33]. This finding can be resulted as the same reason why performance expectancy did not significantly affect behavioral intention. The infrastructure and services to support mobile wallet are still limited at the moment as mobile wallet is still introduced. Those who use it seems don't care with these limitations.

VI. CONCLUSION AND FUTURE RESEARCH

This study found that habit was the factor that most strongly significant affected individual behavioral intention to use mobile wallet in Indonesia. This was the only factor that significant at the $p < 0.001$ level. In addition, social influence was significant affected at the $p < 0.01$ level, followed by effort expectancy and hedonic motivation showed significant relationship toward behavioral intention at $p < 0.05$. Those four factors also showed t-value > 1.96 which concludes that H₂, H₃, H₅ and H₇ are supportive. In contrast, performance expectancy, price value and facilitating conditions had no significant relationship toward behavioral intention. Thus H₁, H₄ and H₆ are not supportive or rejected.

These findings could happen because the mobile wallet is only at introduction phase. In this stage of product life cycle, the product is still immature, showed with high cost, limited support and inconsistent performance. Thus, only small fragment of people categorized as early adopters would show willingness to use this kind of technologies. This finding can reflect that kind of situation where motivation to use the technology is not logical, whereas factors related to technological excellence such as performance, price and facilitate are less concerned. For now, it can be concluded that consumer in Indonesia will use mobile wallet for fun. The impression of those who early adopt it is also very important. Their good impression toward mobile wallet can lead them recommend their families, friends or other people to use it. Furthermore, habit is the most important factor that every mobile wallet provider should pay attention for. It is possible for providers to work together to form habit like how to do with debit, credit card and other payment methods that is popular today.

Thus, based on the findings, this early study suggests that more study is needed in the future as the mobile wallet is continued to growth. The key factors can possibly change as mobile wallet enters new stages such as growth and maturity stages. More factors such as trust and perceived risk should also be included in further study. Finally, the findings can assist management of mobile wallet providers in Indonesia to improve the quality of both product and services in the future.

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