

# Individual Factors As Antecedents of Mobile Payment Usage

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**Abstract**— The aim of this research was to discover the stances of individual elements as antecedents of mobile payment usage. Data was gathered by distributing a questionnaire, which in latter steps was analyzed quantitatively. This research collected 90 samples, of whom represented users of a mobile payment service in Indonesia. The collected dataset was statistically analyzed, by employing partial least square structural equation modelling (PLS-SEM), aided with SmartPLS3.0. The results showed that two types of individual factors, namely individual difference and behavioral belief played significant roles in shaping users' intention to use mobile payments. Individual differences, consisting of mobile payment knowledge and compatibility significantly influenced perceived ease of use. Behavioral belief, such as trust, was shown to significantly influenced perceived usefulness. Finally, perceived ease of use and perceived usefulness concertededly affected mobile payment users' intention to use.

**Keywords**—PLS, SEM, Mobile Payment, Individual

## I. INTRODUCTION

In recent years, more consumers have conducted purchase transactions over the Internet [1], and have led to an increase of customer demands toward a novel payment instrument that allows for mobility to increase convenience, more specifically in small transactions [2]. Since August 2014, the Governor of Indonesia's Central Bank declared the "Non-Cash National Movement" which aims to increase public awareness of non-cash instruments, thereby gradually moving towards a less-cash society.

Despite the ample benefits of using mobile payment services, its adoption in Indonesia is still relatively low. MasterCard Mobile Payments Readiness Index (MMPRI) in 2012 ranked Indonesia 33rd out of 34 countries in the mobile payment readiness survey, placing Indonesia's consumers as 'below average' in terms of familiarity, frequency and willingness to use mobile payment services [3]. This can also be seen in the lack of availability of payment method options using mobile payment or electronic money in Indonesia. Such predicament led the authors to raise the main question in this research, namely, what factors affect Indonesians in using mobile payment services? This research will look more specifically at individual factors and its roles in shaping consumers' behaviors of mobile payment adoption?

There are some previous works that have investigated behavioral aspects of mobile payments adoption. For example, the work of [1] investigated the antecedents of mobile payment and its intention to use in Vietnam, from the perspectives of mobility, convenience, and compatibility. Other researchers focused on comparing individualities and mobile payment system characteristics [4]. Other

researchers, such as [5] focuses on examining the roles of attitude, subjective norm and perceived behavioral control in shaping interests of using mobile payment services.

In this research, individual factor is first loosely understood as anything or circumstance that may influence an individual to do something. This research differs individual factors as individual difference and behavioral belief. Hence, the goal of this study is to elaborate the roles of individual precursors, namely individual difference and behavioral belief, towards consumers' intention to use mobile payment.

## II. HYPOTHESES DEVELOPMENT

Previous studies were analyzed to obtain a theoretical framework for this research. A visual representation of the underlying research model is portrayed in Figure 1. The hypothesis projected herein are elaborated below:

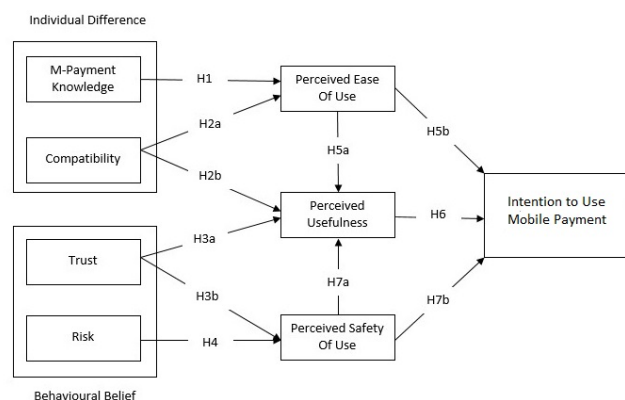


Fig. 1. Underlying Research Model

According to [6], mobile payment knowledge can be defined as knowledge or information concerning the way payment systems are utilized on mobile devices, connected to a mobile communications networks, to induct, approve and approve commercial transactions. Given the popularity of mobile devices, it is very important to understand if those who are users of mobile devices are likely to conduct transactions through mobile payment services. Other research previously conducted has shown the impacts of the level of knowledge concerning mobile payment on the ease of use of mobile payment services [1]. Individuals with higher levels of knowledge concerning mobile payment tend to find the mobile payment service easier to use than those with less knowledge [4]. Customers will find it easier to utilize mobile payment services given a superior degree of knowledge concerning the relevant mobile payment tools [1]. Thus, this research proposes the following hypothesis:

H1: Knowledge concerning mobile payment significantly affects perceived ease of use of mobile payment.

Compatibility can be understood as the operational effectiveness of new services when compared to existing services [7]. Individuals' variety of lifestyles will greatly influence their conclusion of embracing mobile payment services. Mobile payment is an augmentation of conventional Internet-based payments, hence, those who frequently use Internet-based payments tend to have less refusal to accept mobile payment. Such understanding allows for the assumption that perceived compatibility plays a very important role in shaping the intention to adopt a technology. For new services like mobile payment, an individual's ability to assimilate them into their purchasing practices and everyday lifestyle is an eminent element, making it a key success factor of mobile payment services [8]. Therefore, this research proposes the following hypothesis:

H2a: Compatibility significantly affects perceived ease of use of mobile payment.

H2b: Compatibility significantly affects perceived usefulness of mobile payment.

Trust is defined as an individual's willingness to embrace risks with the hopes that their desires are fulfilled [4]. Customers' trust can be identified as an influential factor leading to the triumph of mobile banking, where transactions are conducted on a more vulnerable and uncertain telephone network compared to traditional payment transactions [9]. Transactions made through mobile networks are at risk, with a higher level of uncertainty than any preceding arrangements, thus carrying more risk potentials. Customers who have high trust level on mobile payment services will realize service providers' integrity and reliability; which will augment their intention to use the service [10]. Furthermore, upon conducting transactions, consumers expect personal information to be guaranteed in terms of security, and not be shared with inappropriate parties [11]. Therefore, this study proposes that trusts affect perceived security and perceived usefulness.

H3a: Trust significantly affects perceived usefulness of mobile payment.

H3b: Trust significantly affects perceived security of mobile payment.

Risk relates to the absence of security throughout the payment processes due to mistakes or fraudulent transactions between buyers and sellers [12]. Mobile payment is a form of online transaction that occurs between unknown parties, in which exists financial risks and ambiguity concerning a product's quality. Thus, this research argue that risks affect mobile payment services perceived security.

H4: Risk significantly affects perceived security of mobile payment.

Perceived ease of use is expressed as the level of simplicity and ease to use a particular new system [13]. Hence, it is a vital precursor that affects mobile payment services' intention to use [14]. Perceived ease of use denotes the clarity, understandability, comfortability of users' interactions and experience with the new system [15]. Such understanding allows for the assumption that ease of use is essential precursor influencing new technology acceptance.

Furthermore, perceived ease of use is a factor that shapes perceived usefulness [16].

H5a: Perceived ease of use significantly affects mobile payment's perceived usefulness.

H5b: Perceived ease of use significantly affects mobile payment's intention to use.

Perceived usefulness can be explained as the customer's state of mind concerning the potential of new services in providing benefits and in increasing customers' task performance [17]. According to [18], usefulness can also be understood as customers' believe that adopting new technologies will aid the fulfillment of their expectations. Other research, such as [19] adds that perceived usefulness is a novel amenity that offers more benefits than existing services to those who intend to use it. Therefore, this study suggests that perceived usefulness influences the intention to use mobile payment.

H6: Perceived usefulness significantly affects mobile payment's intention to use.

Perceived security is understood as the confidence that the system ensures confidential user information [20]. Customers will surely pay more attention to security issues in mobile payment services. This becomes an vital component for mobile payment services success [10]. Customers expect that their transaction be accomplished as expected, without data being shared with non-conforming parties [21]. Some even argue that customer security in e-commerce is an important factor because the digital realm carries a higher level of risks when compared to traditional environment [22].

H7a: Perceived security significantly affects mobile payment perceived usefulness.

H7b: Perceived security significantly affects mobile payment intention to use.

### III. RESEARCH METHODOLOGY

This research used a questionnaire-based quantitative approach in gathering data and in conducting hypothesis testing. First of, the variables in the theoretical framework were elaborated to unique question items. Before being disseminated, a readability test was conducted to ensure that all questions were correctly understood. This readability test involved seven individuals whom were active users of mobile payment services. After a thorough revision, the questionnaire was then distributed to the respondents.

The data collection process made use of questionnaires using a survey-form tool with a 6-point Likert scale, having scales that range from strongly disagree to strongly agree. The questionnaire was made using typeform application and then disseminated online through social media. The target of the respondents in this study are those individuals who have previously used mobile payment services.

The questionnaire consisted of 28 questions, representing indicators of eight different variables. The result of this stage is a questionnaire that has been filled by respondents and whose responses were considered as complete and consistent.

Researchers then performed data processing and analysis to test the hypothesis, using Partial Least Square Structural Equational Modeling (PLS-SEM) statistical techniques aided with smartPLS software. Furthermore, data analysis was carried out to test the hypotheses formulated. Then through statistical calculations, the results are discussed by using existing theories as well as previous research results.

IV. RESEARCH RESULTS

A. Respondents Demography

This research resulted in 90 respondents who filled out the questionnaire. However, only 89 was included to further analysis, because one sample was deemed as invalid due to incompleteness.

The demography of the sample was quite diverse. A majority of them were male (56%) and the rest were female (44%). In terms of age, a large number of those who participated in this study were young adults between 25-35 years old (49%). Most of the respondents held a day job (46%) and all of them (100%) use a smart phone on a daily basis. Finally, a large proportion of them (73%) have previously conducted online transaction and online payment.

B. Analysis of the Measurement Model

In this phase, this research will ensure that the data meets all validity and reliability requirements. First, we conducted an examination of the convergence validity. All question items were tested to ensure their loading factor value that represented each indicator on the latent variable were greater than 0.5 [23], [24]. Moreover, the values of Average Variance Extracted (AVE) should surpass 0.5 [24].

This research stumbled upon two indicators that failed meet the Loading Factor threshold, namely H41 and H73. According to [24], indicators that have values of Loading Factor not more than 0.5 should be removed. Upon removal

TABLE 1. ALL INDICATORS LOADING FACTOR VALUES

Variable	Indicator	Loading Factor
Mobile payment knowledge	H11	0.765
	H12	0.796
	H13	0.676
	H14	0.790
Compatibility	H21	0.678
	H22	0.711
	H23	0.875
Trust	H31	0.820
	H32	0.838
	H33	0.804
Risk	H42	0.809
	H43	0.779
	H44	0.822
	Perceived ease of use	H51
H52		0.744
H53		0.746
H54		0.800
Perceived usefulness	H61	0.822
	H62	0.870
	H63	0.875
Perceived security	H71	0.874
	H72	0.823
Intention to use mobile payment	H81	0.822
	H82	0.795
	H83	0.852
	H84	0.615

TABLE II. ASSESSMENT OF CRONBACH'S ALPHA (CA) AND COMPOSITE RELIABILITY (CR)

Variable	CA	CR
Knowledge	0.753	0.843
Compatibility	0.637	0.802
Trust	0.758	0.861
Risk	0.726	0.845
Perceived ease of use	0.758	0.846
Perceived usefulness	0.817	0.891
Perceived security	0.613	0.837
Intention to Use	0.776	0.857

of the two indicators aforementioned, it can be seen that the remaining indicators have met required LF value of greater than 0.5, ensuring the research instrument's convergent validity. All indicators' Loading Factor values are presented in Table 1.

Furthermore, this research also ensured reliability by testing the Cronbach's Alpha (CA) and Composite Reliability (CR) for all indicators. According to [25], a variable is considered to have reliable indicators having CA value exceeding 0.6 and CR value exceeding 0.7. The results are summarized in Table II and presented that indicators reliability in this research have met the requirements.

C. Analysis of the Structural Model

In this step of analysis, this research will first test the Coefficient of Determination ( $R^2$ ) prior to testing the hypotheses. The  $R^2$  measures how much a dependent latent variable can be justified by its preceding independent latent variables [26]. The value of  $R^2$  is considered weak if it has a value of less than 0.19, considered medium if it has a value between 0.19 - 0.33, and is considered strong if it has a value between 0.33 - 0.67 [27]. The results in this research showed that three dependent latent variables had strong preceding relationships with its independent latent variables, namely, intention to use, perceived ease of use and perceived usefulness. Additionally, perceived security exhibited a medium strength relationship to its preceding independent latent variables. The results summarizing the coefficient of determination ( $R^2$ ) values are displayed in Table III.

D. Hypothesis Testing

An examination of t-statistics values as well as p-values were conducted to test the hypotheses. The hypotheses were tested with a predetermined alpha of 0.05, hence the required t-statistics value should be greater than 1.96. Out of the eleven hypotheses tested, this research resulted in seven hypotheses accepted whereas four hypotheses rejected. A review of the hypothesis's examination product is provided in Table IV. The resulting research model is visually presented Figure 2.

V. DISCUSSION

This study found perceived ease of use to positively influenced perceived usefulness alongside intention to use. Mobile payment services are critically questioned by its

TABLE III.  $R^2$  VALUES

Variabel	$R^2$	Category
Perceived ease of use	0.501	Strong
Perceived usefulness (PU)	0.601	Strong
Perceived security	0.302	Medium
Intention to use mobile payment	0.469	Strong

TABLE IV. HYPOTHESES TEST RESULTS

H	Path	T-Statistics	P-Values	Decision
H1	Knowledge → Perceived ease of use	3.607	0.000	Accepted
H2a	Compatibility → Perceived ease of use	2.900	0.004	Accepted
H2b	Compatibility → Perceived usefulness	0.422	0.673	Rejected
H3a	Trust → Perceived usefulness	3.491	0.000	Accepted
H3b	Trust → Perceived security	1.909	0.056	Rejected
H4	Risk → Perceived security	3.738	0.000	Accepted
H5a	Perceived ease of use → Perceived usefulness	2.184	0.029	Accepted
H5b	Perceived ease of use → Intention to use	2.005	0.045	Accepted
H6	Perceived usefulness → Intention to use	2.812	0.005	Accepted
H7a	Perceived security → Perceived usefulness	0.645	0.519	Rejected
H7b	Perceived security → Intention to use	0.573	0.567	Rejected

users in terms of how easy it is to employ. The analysis also yielded that perceived usefulness prejudiced intention to use. The usefulness of services like to mobile payment should be well understood by customers, because it is a critical prerequisite towards adoption. The results in this research also corroborates the arguments of [1] concerning the importance of ease of use in determining the adoption of mobile payment.

Two factors acted as motivators towards perceived ease of use, namely mobile payment knowledge and compatibility. It is safe to assume that mobile device users with higher levels of mobile payment knowledge tend to find the mobile payment service easier to use, when compared to those who lack such knowledge. Mobile device users will experience an easier and more efficient mobile payments transactions, having equipped with a high level of knowledge about mobile payments. In addition, compatibility was also a determinant of ease of use.

Finally, the results showed trust as an antecedent of perceived usefulness. It is known that trusts in payment systems in general, will lessen the necessity to comprehend, govern and supervise activity, enabling users to employ the services easily and efficiently deprived of considerable struggle in translating online services [1]. This research has shown that the same arguments is fitted for mobile payments systems, corroborating trust's role in shaping perceived usefulness in mobile payments.

VI. RESEARCH IMPLICATIONS

The results in this research provided empirical indications concerning the precursors of perceived ease of use in mobile payments, namely mobile payment knowledge and compatibility. This findings extend our understanding of such antecedent, previously argued by [1], [4]. Additionally, the role of trust in shaping mobile payment's perceived usefulness was corroborated, strengthening the arguments set forth by previous research of similar topic [1].

Furthermore, the robustness of TAM was exemplified in mobile payments circumstances, by showing that perceived

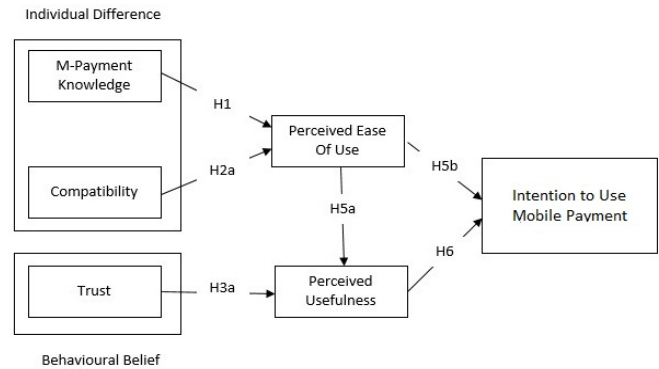


Fig. 2. Resulting Model

usefulness and perceived ease of use both concertedly affected intention to use mobile payments. Such finding validated previous works, such as [4].

Several practical implications are also noteworthy to discuss. First, this research provides insights for organizations offering mobile payment services, more specifically in understanding the way individual factors affected user's intention to use. Those organizations offering mobile payment services should provide ample knowledge for their potential users. The more knowledge an individual has concerning mobile payments leads to a higher perception of ease in using mobile payment services.

Additionally, mobile payment services being offered should ensure compatibility, for example in terms of transaction varieties (purchases, bill payments, etc.) that suit the needs of potential users. These two individual difference factors positively affect perceived ease of use. Furthermore, technological compatibility should also be kept in mind. For example, mobile payment should be offered in platforms compatible with the mobile devices already owned by potential customers.

On the other hand, perceived usefulness was predisposed by an individual's behavioral belief of trust. Organizations offering mobile payment services should strive to continually ensure that their services are safe, reliable, and trustworthy to use, because it will increase users' confidence in the service and their perception of usefulness.

VII. CONCLUSIONS AND RECOMMENDATIONS

This research was designed to explore the roles of individual precursors of user's intention to adopt mobile payments. The results provided empirical evidences that two types of individual factors, namely individual difference and behavioral belief play significant roles in shaping user's intention to use mobile payments.

Individual differences such as having mobile payment knowledge and ensuring mobile payment compatibility significantly predisposed perceived ease of use. Moreover, behavioral belief, such as trust, was shown to significantly influenced perceived usefulness. Finally, both perceived ease of use and perceived usefulness concertedly affected users' intention to use mobile payment.

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