Journal of Theoretical and Applied Information Technology
15th April 2023. Vol.101. No 7

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

E-WALLET ADOPTION IN INDONESIA: REALIZE E-WALLET GROWTH PROJECTIONS UNTIL 2025

[1]GIOVANI ANGGASTA PURNAMA, [2]NILO LEGOWO

[1]Information Systems Management Department, BINUS Graduate Program – Master of Information System Management, Bina Nusantara University, Jakarta 11480, Indonesia

[2]Information Systems Management Department, BINUS Graduate Program – Master of Information System Management, Bina Nusantara University, Jakarta 11480, Indonesia

E-mail: [1] giovani.purnama@binus.ac.id, [2] nlegowo@binus.edu

ABSTRACT

Until now, the use of e-wallets in Indonesia has continued to increase year after year, so it is not surprising that there are projections stating that its growth will reach 3 times until 2025. Of course, e-wallet service providers must improve their quality. Thus, this research aims to determine what factors influence a person's adoption of e-wallets to make digital payments in Indonesia using the updated DeLone & McLean IS Success Model, which has been modified. It gathers data from 401 respondents. The collected data were analyzed using Partial Least Square Structural Equation Modeling (PLS-SEM) on SmartPLS 4 software. The results found that InQ, SyQ, and SeQ have a significant effect on PT; InQ, SyQ, and SeQ have a significant effect on Sat; PS, InQ, SyQ, and SeQ have a significant effect on ITU; PT and Sat have a significant effect on AoE. Apart from the variables above, it has no significant effect on other variables. In connection with the research results, e-wallet service providers must improve the quality of information, systems, and services to gain the trust and satisfaction of their users because this will affect the adoption of e-wallet use. In addition to improving the quality of information, systems, and services, it is also necessary to increase security guarantees that can increase the intention to use e-wallets. The findings of this research can serve as a guide for e-wallet service providers to build a better e-wallet development plan.
Keywords: *Digital Payment, Adoption of E-Wallet, Updated IS Success Model, PLS-SEM, Indonesia*

1. INTRODUCTION

Digital transformation is a change in the company that is triggered by the times by utilizing existing digital technology to improve current processes and explore digital innovations that have the potential to change the company's business model [1]. Until now, digital transformation has affected companies and everyone in most areas of activity. Then the impact will continue to increase in the future [2] due to the push towards greater use of technology [3] so that new technology in the form of digital platforms has become mandatory to use [4]. Of course, this presents new challenges for companies [5].

The emergence of digital platforms has changed many industries globally and is considered an alternative to meet the various needs of society, including in the financial sector [6]. Digital innovation in the financial sector, commonly known as "Fintech" (Financial Technology), has developed rapidly in recent years [7] because it makes financial transactions practical, simple, and effective [8]. FinTech offers new products, applications, and business models that can influence the provision of financial services and the development of the financial industry and create a market culture of competition and reputation among service providers [9].

One of the products of fintech in Indonesia is digital payment [10], with reference to the use of technology [11]. To make digital payments, you can use mobile payments, a non-cash payment instrument, by using a smartphone device. [12]. Of course, every mobile payment user must first have digital money, namely an e-wallet [12], [13]. An e-wallet is a payment method without using cash but using a smartphone that consists of money transfer services, bill payments, etc [14]. The use of e-wallets

is considered to make transactions easier, faster, and safer [15].

In 2021, a payment network company founded in 2008, based in the United States and England, named BOKU, created the Mobile Wallets Report 2021 in partnership with Juniper Research. The report projects the country with the fastest growth rate for mobile payments over the next five years, where Indonesia ranks 10th out of 32 other countries with a Compounded Annual Growth Rate (CAGR) figure of 33.7%. In Indonesia, the volume of mobile payment transactions reached $22968.9 in 2020, and it is projected to reach $98093.6 in 2025. It also projects the fastest-growing mobile wallets, where 69 mobile wallets will process transactions of more than $1 billion in 2025.

From these data, it was found that five mobile wallets from Indonesia ranked 22nd–26th, with a Compounded Annual Growth Rate (CAGR) reaching 30.6% [16]. The five mobile wallets, namely OVO, ShopeePay, LinkAja, GoPay, and DANA, are experiencing extreme competition due to rapidly growing market opportunities, so they are competing for market share and developing their ecosystems to become the best [16], [17]. In 2025, the number of transactions on OVO is projected to reach $40907.7; on ShopeePay is projected to reach $16735.0; on LinkAja is projected to reach $14875.5; on Gojek is projected to reach $14131.8; on DANA is projected to reach $13106.1.

The Mobile Wallets Report 2021 notes that OVO leads the market share with a percentage of 38.2%, followed by ShopeePay with a percentage of 15.6%, LinkAja with a percentage of 13.9%, GoPay with a percentage of 13.2%, DANA with a percentage of 12.2%, and others with a percentage of 6.9% [16]. The occurrence of competition between e-wallet service providers is a natural thing in connection with Indonesia as a country with very low credit card penetration so this becomes one of the biggest opportunities for merchants who accept mobile payments. It resulted in the adoption of mobile wallets, bringing tens of millions of new consumers to digital commerce very quickly.

Based on that, Indonesia ranks 3rd as a country with the fastest growth profiled in the 2021 Mobile Wallets Report. The report also projects the growth of mobile wallets in Indonesia where mobile wallet penetration could triple from 25.6% to 76.5% over the next five years with almost tenfold growth in transactions, from 1.7B to 16B In 2025 [16]. Then this can be interpreted that Indonesia will experience economic growth until 2025 [18]. Of course, the projections from the Mobile Wallets may Report 2021 will come true considering that currently, the number of e-wallet users has increased dramatically from year to year [19].

Therefore, service providers must anticipate various things, including their security systems [20], [21]. It is considered that cybercrime still often occurs among users of financial technology platforms [22] which causes some users concerned about securing their data when conducting various transactions via smartphones [23]. Moreover, service providers must also improve the complaints from e-wallet users to realize the projected increase in the value of e-wallet transactions in Indonesia. In order to contribute to a slowing inflation rate by reducing the amount of cash in circulation, which will affect interest rates in the market [24].

The researcher chose three e-wallets (OVO, LinkAja, and DANA) for this research because each of them can be downloaded directly from the Play Store or Appstore without going through other applications, so a balanced comparison can be made. The research was conducted by first finding out complaints from e-wallet users by taking feedback data from the Google Play store using Google Colab and the Python programming language from July to September 2022. The findings showed that some users face dissatisfaction when using the e-wallet since errors frequently arise in the application, users are unable to complete transactions, some functionalities are inaccessible, customer support is rated poorly, the balance does not update in real-time, etc.

This research intends to learn more about the factors that influence users' adoption of e-wallets such as OVO, LinkAja, and DANA in Indonesia, specifically in the DKI Jakarta region. It was selected because research shows that the DKI Jakarta region, which has a population of 9.041 million, has a larger rate of e-wallet users [25]. This research refers to the Updated DeLone & McLean IS Success Model to assess an information system's efficacy, which is crucial for a business to understand the value of information system management and information system investment. Of course, there are modifications to the Updated IS Success Model regarding several previous studies.

2. LITERATURE REVIEW

2.1 THEORETICAL FOUNDATION

An E-wallet, also known as a digital wallet or m-wallet, is one of the modern electronic wallets from technological innovations that have penetrated and dominated the economy in both developing and developed countries [26] where financial transactions are conducted online via electronic

devices such as smartphones. E-wallet eliminates the need for a physical wallet, allows users to store, and carry their financial cards (debit cards, credit cards, prepaid money cards, and so on) in virtual media [27]. OVO is one of the e-wallets in Indonesia, launched in March 2017 and is under the auspices of PT Visionet Internasional [28], LinkAja is a payment service provider launched under the auspices of PT Fintek Karya Nusantara (Finarya), a subsidiary of 10 State-Owned Enterprises (BUMN) [29] in February 2019, and DANA is an Indonesian digital wallet designed to make every non-cash and non-card transaction digitally, both online and offline, run quickly, practically, and with guaranteed security [30] that was officially launched on November 2018 [31].

There is some information systems' user adoption that has been studied using the DeLone and McLean IS Success Model; measuring the success or effectiveness of information systems is very important for a company to see the value associated with information system management and information system investment [32]–[35]. The IS Success Model was first introduced by DeLone and McLean in 1992 and is based on empirical information systems theory and research conducted by several researchers in the 1970s and 1980s. However, the role of information systems has changed and developed according to the times. This caused the measurement of the success of information systems to also develop. So in 2003, DeLone and McLean reviewed and evaluated the IS Success Model to create the Updated DeLone and McLean IS Success Model, which added the dimensions of service quality and net benefit, which are a combination of two dimensions, namely individual impact and organizational impact, from the previous IS Success Model which can be seen in Figure 1 below [36].

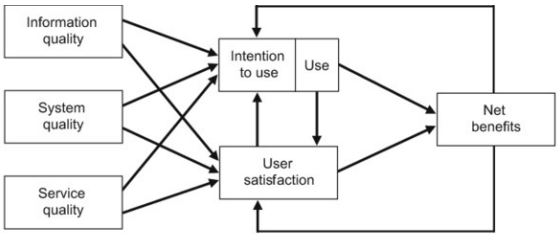

Figure 1 . Updated DeLone and McLean IS Success Model [36]

2.2 VARIABLES AND HYPOTHESES

2.2.1 PERCEIVED SECURITY (PS)

Perceived security refers to the extent to which users believe that the use of technology is safe, especially privacy and data security issues, which are considered a threat factor that can cause data loss, information corruption, misuse, fraud, and possible alteration of the original data [37], [38]. Security is an important guarantee to build user confidence in using the technology [39]. Research from Al-Okaily found that security is considered the main determinant to gain user trust in terms of technology use [40]. Based on the above depiction, the following is hypothesized:

Hypothesis 1 (H_1). Perceived Security (PS) has a significant positive effect on Perceived Trust (PT).

Hypothesis 8 (H_8). Perceived Security (PS) has a significant positive effect on Intention to Use (ITU).

2.2.2 INFORMATION QUALITY (INQ)

Information quality is considered the main construct that influences users' attitudes toward the technology they use to obtain satisfaction, which can lead to the intention to use the technology [32]. High-quality information is a symbol of the ability, credibility, and integrity of service providers that are not easily imitated or faked; high-quality information will cause users to tend to feel satisfied with the use of the technology [34]. Information quality can be measured by accuracy, timeliness, completeness, relevance, and consistency [36]. Thereby, we develop the following hypotheses:

Hypothesis 2 (H_2). Information quality (InQ) has a significant positive effect on Perceived Trust (PT).

Hypothesis 5 (H_5). Information quality (InQ) has a significant positive effect on Satisfaction (Sat).

Hypothesis 9 (H_9). Information quality (InQ) has a significant positive effect on Intention to Use (ITU).

2.2.3 SYSTEM QUALITY (SYQ)

System quality represents the user's perception of the technical quality of the usability and overall system performance where the high quality of the system owned by the service provider will increase user trust and satisfaction [34]. System quality can be measured by ease of use, functionality, reliability, flexibility, data quality, portability, integration, and the importance [36]. Hence, the following hypothesis is proposed:

Hypothesis 3 (H_3). System quality (SyQ) has a significant positive effect on Perceived Trust (PT).

Hypothesis 6 (H_6). System quality (SyQ) has a significant positive effect on Satisfaction (Sat).

Hypothesis 10 (H_{10}). System quality (SyQ) has a significant positive effect on Intention to Use (ITU).

2.2.4 SERVICE QUALITY (SEQ)

Service quality is an important part of measuring the effectiveness of service provider

information systems by ensuring the quality of services provided from the user's point of view [32]. Technology users tend to trust high-quality service providers; users need timely, reliable, professional, and personalized services, which will increase users' satisfaction with and trust in the technology [34]. Service quality can be measured by assurance, empathy, and responsiveness [36]. Thus, the following is hypothesized:

Hypothesis 4 (H_4). Service quality (SeQ) has a significant positive effect on Perceived Trust (PT).

Hypothesis 8 (H_7). Service quality (SeQ) has a significant positive effect on Satisfaction (Sat).

Hypothesis 11 (H_{11}). Service quality (SeQ) has a significant positive effect on Intention to Use (ITU).

2.2.5 PERCEIVED TRUST (PT)

Perceived trust can be defined as the positive expectation of technology users toward service providers [41]; when someone trusts a service provider, they will continue to use the technology [21], [39]. Three beliefs contribute to perceived trust: namely, integrity, which means service providers will fulfill their obligations; ability, which means service providers have the sufficient technical knowledge to fulfill their promises; and virtue, which means the care of service providers will protect the interests of consumers [41]. Research from Sharma found that trust is the most influential factor on user satisfaction [32]. Based on the depiction above, this research proposes the following:

Hypothesis 12 (H_{12}). Perceived Trust (PT) has a significant positive effect on Adoption of E-Wallet (AoE).

2.2.6 SATISFACTION (SAT)

Satisfaction is a psychological reaction to the process of using technology so that it reflects positive feelings from users after interacting with services, a high level of satisfaction will present a higher intention of users to use technology and this can be achieved by making system performance that meets user expectations [32], [33], [35]. Satisfaction can be measured by repeat purchases, repeat visits, and user surveys [36]. As such, the following hypothesis is proposed:

Hypothesis 13 (H_{13}). Satisfaction (Sat) has a significant positive effect on Adoption of E-Wallet (AoE).

2.2.7 INTENTION TO USE (ITU)

Intention to use is a measure of the intensity of a person's intention to use a technology [21]. Research from Qu found that the intention to use an e-wallet is a strong desire from someone to use an e-wallet application or an expectation to be able to use it occasionally. Intention to use an e-wallet can shape a person's tendency to use e-wallet applications and will ultimately motivate potential users to engage in actual use in the form of adoption of an e-wallet [35]. Thus, the following is hypothesized:

Hypothesis 14 (H_{14}). Intention to Use (ITU) has a significant positive effect on Adoption of E-Wallet (AoE).

2.2.8 ADOPTION OF E-WALLET (AOE)

The adoption of an E-Wallet is associated with a digital currency that uses several payment platforms to increase points of sale anytime and anywhere; an e-wallet is here to simplify buying and selling transactions through the use of smartphone applications [21]. If the users of the e-wallet application realize that the information system and service quality are satisfactory, then the user will intend to use the e-wallet application and eventually engage in the use of the actual e-wallet application [35].

To the previous explanation, this research will examine the influence between variables from the research model in Figure 2 and then generate 14 hypotheses.

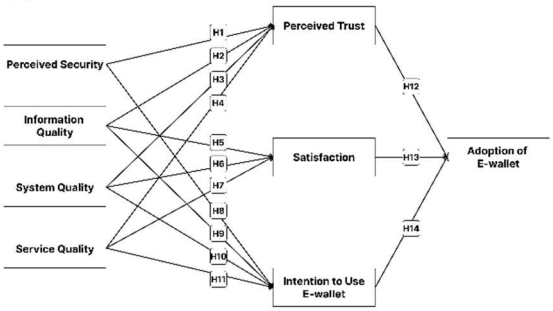

Figure 2 . Research Framework

3. RESEARCH METHODOLOGY

3.1. DATA COLLECTION

Data collection for this research was done using a Google Form survey from November to December 2022 using a cluster random sampling technique. The questionnaires were filled out by the people in Indonesia who have made purchases using an e-wallet, there are 401 questionnaire responses qualified for statistical analysis. The Google Form is a convenient sampling technique used to carry out data collection; we use random sampling techniques. To guarantee the correctness of the answers, the author translated each questionnaire item first into

the Indonesian language before translating it again into the English language.

3.2. MEASUREMENT AND SCALES

All of the indicator items included in this research were taken from instruments that had already received validation. Three items for PS were retrieved from Yuan and Okaily [39], [40]. Next, three items each for InQ were adopted from Sharma, Yuan, and Chatterjee [32], [34], [35], while three items each for SyQ were adopted from Yuan and Chatterjee [34], [35], and three items each for SeQ were adopted from Sharma and Yuan [32], [34]. Moreover, three items for PT were obtained from Yang, Shankar, Daragmeh, and Yuan [21], [37], [39], [41], whereas three items for Sat were adopted from Sharma, Francisco, and Yuan [34], [42]. Lastly, the IEW was taken from Yang, Sharma, Zhao, Bo, and Okaily [21], [32], [38]–[40], while the AoE was taken from Yang [21].

3.3. DATA ANALYSIS

Data analysis was carried out to determine the effect of each variable using SmartPLS 4 software, which was run on computer media. PLS (Partial Least Square) is a variant-based Structural Equation Modeling (SEM) method that can simultaneously test measurement models in terms of validity and reliability. The Partial Least Square Structural Equation Modeling (PLS-SEM) was used to estimate complex cause-and-effect connection models using latent variables. The PLS-SEM technique using SmartPLS was appropriate for this research since the research sample was larger than 100 (n = 401), used to investigate the causal-effect linkages presented in this research model.

4. RESULTS

4.1 DEMOGRAPHIC CHARACTERISTIC

Table 1 shows the demographic profiles of the respondents in this research. Apparently, more of the respondents were female (53.9%) than male (46.1%). A majority of the respondents were 17–25 years old (67.8%), while 30.4% were 26-41 years old, and 1.7% were 42-57 years old. Most of the respondents domiciled in West Jakarta (27.2%), while 21.2% in South Jakarta, 20.7% in North Jakarta, 17.2% in Central Jakarta, 13.5% in East Jakarta, and 0.2% in Kabupaten Administrasi Kepulauan Seribu. In total, 47.9% of the respondents were using OVO, 39.7% using Dana, and 12.5% using LinkAja.

Table 1 : Demographic Characteristic

	N	%
Gender		
Female	216	53.9
Male	185	46.1
Total	**401**	**100**
Age Group		
17-25 years	272	67.8
24-41 years	122	30.4
42-57 years	7	1.7
58 and above	0	0
Total	**401**	**100**
Domiciled		
West Jakarta	109	27.2
South Jakarta	85	21.2
North Jakarta	33	20.7
Central Jakarta	69	17.2
East Jakarta	54	13.5
Kabupaten Administrasi Kepulauan Seribu	1	0.2
Total	**401**	**100**
E-Wallet		
OVO	192	47.9
DANA	159	39.7
LinkAja	50	12.5
Total	**401**	**100**

4.2 MEASUREMENT MODEL

The first step in SEM is to assess the measurement model, such as validity and reliability. The validity test on the PLS-SEM method has two types: convergent validity and discriminant validity [43]. Convergent validity is the extent to which the variables measured formatively correlate positively with alternative measures of the same variable [43]. The convergent validity is determined using Loading Factor (Outer Loading) with 0.7 as a minimum value and Average Variance Extract (AVE) with 0.5 as a minimum value [43]. Meanwhile, discriminant validity is the extent to which a variable is different from other variables, in terms of how much the variable is correlated with other variables, and how many indicators represent only one variable [43]. The convergent validity is determined using cross-loading that shows the correlation value between indicators and variables and the value of each indicator must be higher with its variable compared to other variables [43]. Next, the reliability test is used to determine the consistency of measuring instruments [43]. The reliability test on the PLS-

SEM method has two types: cronbach alpha and composite reliability [43]. Cronbach alpha will provide an estimate of reliability based on the intercorrelation of the observed indicator variables and composite reliability is the degree to which the underlying variable is free from random error, both of them use 0.7 as a minimum value [43].

The loading factor test shows that most of the indicators for each variable are valid because they have a value of ≥ 0.70, but there is 1 indicator from the adoption of the e-wallet variable with the AoE3 code that is invalid, so this indicator will be deleted and a second test will be carried out. For the results of the second test, it is known that all indicators of each variable are declared valid because they have a value ≥ 0.70. More complete results from the first and second loading factor tests can be seen in table 5 on the bottom page. The AVE test result for this research is valid because the results showed that all constructs had significant AVE, which is above 0.5. Then, in the cross-loading test, the results show that all variables have a greater correlation value on their variables compared to other variables, so it is valid and can be seen in table 6 on the bottom page. Furthermore, the cronbach alpha and composite reliability are reliable because the results showed that all constructs are above 0.7. Table 2 shows the values of Average Variance Extract (AVE), Cronbach Alpha, and Composite Reliability.

Table 2 : Validity and Reliability

Variables	Indicators	AVE	CA	CR
PS	3	0.750	0.833	0.833
InQ	3	0.700	0.786	0.786
SyQ	3	0.720	0.805	0.805
SeQ	3	0.740	0.824	0.824
PT	3	0.703	0.788	0.788
Sat	3	0.710	0.796	0.796
ITU	3	0.684	0.769	0.769
AoE	3	0.779	0.717	0.719

Note: AVE: Average Variance Extract; CA: Cronbach Alpha; CR: Composite Reliability; PS: Perceived Security; InQ: Information Quality; SyQ: System Quality; SeQ: Service Quality; PT: Perceived Trust; Sat: Satisfaction; ITU: Intention to Use; AoE: Adoption of E-Wallet.

4.3 STRUCTURAL MODEL

The second step in SEM is to assess the structural model, such as the path coefficient and R-Square. The path coefficient test is a value that indicates the direction of the relationship between the variables, and the value ranges from -1 to +1, while R-Square is a measurement of the prediction accuracy of a model by analyzing endogenous variables, where the results will show whether there is a real influence of exogenous variables on endogenous variables, and the value ranges from 0 to 1 [43]. In the path coefficient test, the results show that all variable relationships are positive because the results are more than 0 and close to +1 which can be seen in Figure 3 below.

Table 3 : Path Coefficient Test

Hypotheses	Path Coefficient	Result
Perceived Trust		
H_1 PS -> PT	0.074	Positive
H_2 InQ -> PT	0.201	Positive
H_3 SyQ -> PT	0.364	Positive
H_4 SeQ -> PT	0.298	Positive
Satisfaction		
H_5 InQ -> Sat	0.277	Positive
H_6 SyQ -> Sat	0.439	Positive
H_7 SeQ -> Sat	0.233	Positive
Intention to Use		
H_8 PS -> ITU	0.124	Positive
H9 InQ -> ITU	0.188	Positive
H_{10} SyQ -> ITU	0.369	Positive
H_{11} SeQ -> ITU	0.239	Positive
Adoption of E-Wallet		
H_{12} PT -> AoE	0.410	Positive
H_{13} Sat -> AoE	0.309	Positive
H_{14} ITU -> AoE	0.114	Positive

Table 4 : R-Square Test

Variables	R^2	Result
Perceived Trust	0.778	High
Satisfaction	0.807	High
Intention to Use	0.747	Moderate
Adoption of E-Wallet	0.622	Moderate

Based on the results of the R-Square test in table 4 it can be seen:

1. The perceived trust variable has an R-Square value of 0.778, which means it has a high level of prediction accuracy. Thus, the variables that make up the perceived trust variable can explain the perceived trust variable by 77.8% and the remaining 22.2% is explained by other variables outside this research.
2. The satisfaction variable has an R-Square value of 0.807, which means it has a high level of prediction accuracy. Thus, the variables that make up the satisfaction variable can explain the satisfaction variable by 80.7% and the remaining 19.3% is explained by other variables outside this research.
3. The intention to use variable has an R-Square value of 0.747, which means it has a moderate level of prediction accuracy but tends to be high. Thus, the variables that make up the

intention to use variable can explain the intention to use variable by 74.7% and the remaining 25.3% is explained by other variables outside this research.

4. The adoption of e-wallet variable has an R-Square value of 0.622, which means it has a moderate level of prediction accuracy. Thus, the variables that make up the adoption of e-wallet variable can explain the adoption of e-wallet variable by 62.2% and the remaining 37.8% explained by other variables outside of this research.

4.4 TESTING OF HYPOTHESES

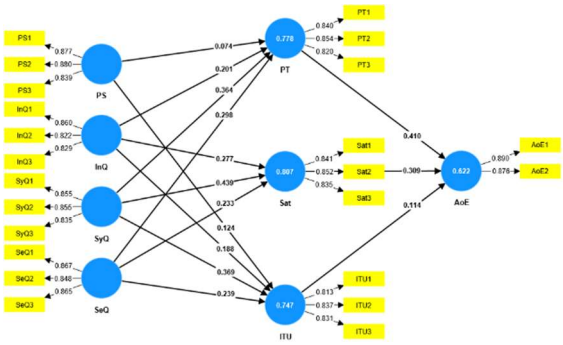

Figure 3 . Hypothesis Testing

Figure 3 shows the results of a test of 14 hypothesis using the t-statistics and p-value. There is a significant relationship if the t-statistics result is ≥ 1.96; otherwise, there is no significant relationship. The hypothesis is then accepted if the p-value is ≤ 0.05, and rejected if the p-value is ≥ 0.05. Table 7 displays the outcome, and the explanation is underneath.

In this research, the relationship between perceived security and perceived trust has a t-statistics value of 1.216 ≤ 1.96 and a p-value of 0.224 ≥ 0.05 with a path coefficient value of 0.074. This shows that the perceived security variable and its indicators do not have a significant positive effect on the perceived trust variable, so H_1 is rejected.

The relationship between information quality and perceived trust has a t-statistics value of 4.061 ≥ 1.96 and a p-value of 0.000 ≤ 0.05 with a path coefficient value of 0.201. This shows that the information quality variable and its indicators have a significant positive effect on the perceived trust variable, so H_2 is accepted.

The relationship between system quality and perceived trust has a t-statistics value of 6.387 ≥ 1.96 and a p-value of 0.000 ≤ 0.05 with a path coefficient value of 0.364. This shows that the system quality variable and its indicators have a significant positive effect on the perceived trust variable, so H_3 is accepted.

The relationship between service quality and perceived trust has a t-statistics value of 5.509 ≥ 1.96 and a p-value of 0.000 ≤ 0.05 with a path coefficient value of 0.298. This shows that the service quality variable and its indicators have a significant positive effect on the perceived trust variable, so H_4 is accepted.

The relationship between information quality and satisfaction has a t-statistics value of 5,904 ≥ 1.96 and a p-value of 0,000 ≤ 0.05 with a path coefficient value of 0.277. This shows that the information quality variable and its indicators have a significant positive effect on the satisfaction variable, so H_5 is accepted.

The relationship between system quality and satisfaction has a t-statistics value of 8.777 ≥ 1.96 and a p-value of 0.000 ≤ 0.05 with a path coefficient value of 0.439. This shows that the system quality variable and its indicators have a significant positive effect on the satisfaction variable, so H_6 is accepted.

The relationship between service quality and satisfaction has a t-statistics value of 4.679 ≥ 1.96 and a p-value of 0.000 ≤ 0.05 with a path coefficient value of 0.233. This shows that the service quality variable and its indicators have a significant positive effect on the satisfaction variable, so H_7 is accepted.

The relationship between perceived security and intention to use has a t-statistics value of 1.990 ≥ 1.96 and a p-value of 0.047 ≤ 0.05 with a path coefficient value of 0.124. This shows that the perceived security variable and its indicators have a significant positive effect on the intention to use variable, so H_8 is accepted.

The relationship between information quality and intention to use variable has a t-statistics value of 3.179 ≥ 1.96 and a p-value of 0.001 ≤ 0.05 with a path coefficient value of 0.188. This shows that the information quality variable and its indicators have a significant positive effect on the intention to use variable, so H_9 is accepted.

The relationship between system quality and intention to use has a t-statistics value of 6.401 ≥ 1.96 and a p-value of 0.000 ≤ 0.05 with a path coefficient value of 0.369. This shows that the system quality variable and its indicators have a significant positive effect on the intention to use variable, so H_{10} is accepted.

The relationship between service quality and intention to use has a t-statistics value of 3,901 ≥ 1.96 and a p-value of 0,000 ≤ 0.05 with a path coefficient value of 0.239. This shows that the service quality variable and its indicators have a

significant positive effect on the intention to use variable, so H_{11} is accepted.

The relationship between perceived trust and adoption of e-wallet has a t-statistics value of 6.469 ≥ 1.96 and a p-value of 0.000 ≤ 0.05 with a path coefficient value of 0.410. This shows that the perceived trust variable and its indicators have a significant positive effect on the adoption of e-wallet variables, so H_{12} is accepted.

The relationship between satisfaction and adoption of e-wallet has a t-statistics value of 4.551 ≥ 1.96 and a p-value of 0.000 ≤ 0.05 with a path coefficient value of 0.242. This shows that the satisfaction variable and its indicators have a significant positive effect on the adoption of e-wallet variable, so H_{13} is accepted.

The relationship between intention to use and adoption of e-wallet has a t-statistics value of 1.953 ≤ 1.96 and a p-value of 0.051 ≥ 0.05 with a path coefficient value of 0.114. This shows that the intention to use variable and its indicators do not have a significant positive effect on the adoption of e-wallet variable, so H_{14} is rejected.

5. DISCUSSION

The result of H_1 indicates that the perceived security by e-wallet users does not affect the perceived trust by e-wallet users. The results obtained are different from Daragmeh et al and Zhao et al research [37], [39], which found that the perceived security variable has a significant positive effect on the perceived trust variable.

The result of H_2 indicates that the quality of the information owned by the e-wallet application affects the perceived trust by e-wallet users, the more information has a high level of accuracy, timeliness, completeness, relevance, and high consistency, the higher perceived trust by users and vice versa. The results obtained are also supported by research from Yuan et al [34], where researchers guarantee that high-quality information is important for an application (in their research is an m-payment). If an application has poor information quality then users will question the ability of service providers and may feel distrustful of the information they receive because they are worried about fraud committed by service providers. Based on that, high-quality information becomes a symbol of competitiveness between service providers that is not easily imitated or faked and shows better capability, credibility, and integrity among service providers so that once users feel that the quality of the information provided is high, they will tend to have greater trust in service providers [34].

The result of H_3 indicates that the quality of the system owned by the e-wallet application affects the perceived trust by e-wallet users, the more system has a high level of ease-of-use, functionality, reliability, flexibility, data quality, portability, integration, and importance, the higher perceived trust by users and vice versa. The results obtained are also supported by research from Li et al and Yuan et al [33], [34], where Li et al argue that the quality of the system provided by service providers will benefit individual performance through the use of the system (in their research is a cloud financial information system) because it can increase efficiency for users so that in the end they feel confident to use the system [33]. Furthermore, research from Yuan et al found that high system quality is a prerequisite for winning user trust in using an application (in their research is an m-payment). If users feel that the quality of the system provided by the service provider is poor, then they will have doubts about the service provider's ability to feel distrusted in using the application [34].

The result of H_4 indicates that the quality of the service provided by the e-wallet application affects the perceived trust by e-wallet users, the more service has a high level of assurance, empathy, and responsiveness, the higher perceived trust by users and vice versa. The results obtained are also supported by research from Li et al and Yuan et al [33], [34], where Li et al found that service quality is an important component to be provided to system users (in their research is a cloud financial information system), if users can feel that the quality of services provided has increased, they will believe in using the system [33]. Research from Yuan et al also consider that the importance of service quality has been brought to a new level as the main perceived attribute of payment products, the trust of application users (in their research is an m-payment) is influenced by service quality [34].

The result of H_5 indicates that the quality of the information owned by the e-wallet application affects the satisfaction of e-wallet users, the more information has a high level of accuracy, timeliness, completeness, relevance, and consistency, the higher user's satisfaction and vice versa. The results obtained are also supported by research from Chatterjee et al, Li et al, Sharma et al, and Yuan et al [32]–[35], where Chatterjee et al found that the role of information quality is transparent and well-organized regarding the use of technology (in their research is an Internet of Things (IoT) combined with an Artificial Intelligence (AI)) will have an impact on user satisfaction with this technology, users always measure the level of quality of

information based on the aspects above [35]. Furthermore, research from Li et al argue that user satisfaction with the quality of the information provided by service providers will benefit individual performance through the use of the system (in their research is a cloud financial information system) because it can increase efficiency for users so that finally they are satisfied with the use of the system [33]. Then, research from Sharma et al found that the quality of information is one of the main determinants that influence user satisfaction with the applications they use (in their research is an m-banking), the absence of good quality information will increase the difficulty for users to use the application and this will make user satisfaction decrease because expectations for the quality of the information are not met [32]. Research from Yuan et al also guarantee that high-quality information is important for an application (in their research is an m-payment), high-quality information becomes a symbol of competitiveness between service providers that is not easily imitated or faked and shows greater ability, credibility, and integrity among service providers so that once users feel that the quality of the information provided is high, they will tend to have greater satisfaction with the service provider [34].

The result of H_6 indicates that the quality of the system owned by the e-wallet application affects the user's satisfaction, the more system has a high level of ease-of-use, functionality, reliability, flexibility, data quality, portability, integration, and importance, the higher user's satisfaction and vice versa. The results obtained are also supported by research from Li et al and Yuan et al [33], [34], where Li et al argue that the quality of the system provided by service providers will benefit individual performance through the use of the system (in their research is a cloud financial information system) because it can increase efficiency for users so that in the end they feel satisfied to use the system [33]. Furthermore, research from Yuan et al also found that high system quality is a prerequisite for winning user satisfaction in using an application (in their research is an m-payment). If users feel the quality of the system provided by the service provider is poor, then they will have doubts about the service provider's ability to reduce their level of satisfaction [34].

The result of H_7 indicates that the quality of services owned by the e-wallet application affects the satisfaction of e-wallet users, the more service has a high level of assurance, empathy, and responsiveness, the higher user's satisfaction and vice versa. The results obtained are also supported by research from Li et al, Sharma et al, and Yuan et al [32]–[34], where Li et al argue that service quality is an important component provided to system users (in their research is a cloud financial information system), if the users can feel that the quality of the services provided has increased then the level of satisfaction will also increase [33]. Furthermore, research from Sharma et al argue that service quality is the main determinant that can influence the experience of application users (in their research is an m-banking) which will have an impact on their level of satisfaction in using an application [32]. Research from Yuan et al also considers that the importance of service quality has been brought to a new level as the main perceived attribute of payment products, the satisfaction of application users (in their research is m-payment) is influenced by service quality [34].

The result of H_8 indicates that the perceived security by the users affects the user's intention to use the application, the higher privacy and data security provided by the service provider, so the higher user's intention to use an application and vice versa. The results obtained are also supported by research from Okaily et al and Qu et al [38], [40], where Okaily et al consider that the security of financial information during digital transactions is considered a key determinant of trust in relationships web-based, users tend to have the intention to use the application (in their research is an m-payment) if the application has a high level of security [40]. Furthermore, research from Qu et al argue that the perceived security by users primarily based on their perceptions of reliability and privacy will influence the user's intention to use an application (in their research is an e-cash) [38].

The result of H_9 indicates that the quality of the information owned by the e-wallet application affects the user's intention to use the application, the more the information has a high level of accuracy, timeliness, completeness, relevance, and consistency, the higher the intention of users to use an application and vice versa. The results obtained are supported by research from Chatterjee et al and Sharma et al [32], [35], where Chatterjee et al found that the role of transparent and well-organized information quality regarding the use of technology (in their research is an Internet of Things (IoT) combined with Artificial Intelligence (AI)) will have an impact on user interest in using this technology, users always measure the level of information quality based on the aspects described in the previous paragraph [35]. Furthermore, research from Sharma et al found that information quality is one of the main determinants that influence a person's intention to use an application (in their research is an

m-banking), the quality of the information provided by service providers will motivate users to develop the intention to use the technology [32].

The result of H_{10} indicates that the quality of the system owned by the e-wallet application affects the user's intention to use an application, the more system has a high level of ease-of-use, functionality, reliability, flexibility, data quality, portability, integration, and importance, the higher the user's intention to use an application and vice versa. The results obtained are also supported by research from Chatterjee et al [35], where researchers found that users' perceptions of system performance are taken into account, users usually try to be aware of the quality of the system from all aspects so the high system quality will attract potential users to using this technology (in their research is an Internet of Things (IoT) combined with Artificial Intelligence (AI)) and increase the intention of users to use an application [35].

The result of H_{11} indicates that the quality of the service provided by the e-wallet application affects the user's intention to use an application, the more service has a high level of assurance, empathy, and responsiveness, the higher user's intention to use an application and vice versa. The results obtained are also supported by research from Chatterjee et al and Sharma et al [32], [35], where Chatterjee et al found that user intention to use technology (in their research is an Internet of Things (IoT) combined with Artificial Intelligence (AI)) depends on the quality of the services provided [35]. Furthermore, research from Sharma et al argue that service quality is the main determinant that can affect the experience of application users (in their research is an m-banking) which will impact their intention to use an application [32].

The result of H_{12} indicates that the perceived trust by users affects the adoption of the use of e-wallet applications, the higher integrity, ability, and kindness provided by service providers, so the higher adoption of the use of e-wallet applications and vice versa. The results obtained are also supported by research from Shankar et al [41], where researchers argue that trust is an important factor when adopting services that support technology (in their research is an m-payment), personal and financial information is provided by users to service providers so that trust plays an important role in the adoption of the use of an application [41].

The result of H_{13} indicates that the level of user satisfaction affects the adoption of the use of e-wallet applications, the more repeat purchases, repeat visits, and good user surveys occur, the higher adoption of the use of e-wallet applications and vice versa. The results obtained are also supported by research from Sharma et al [32], where researchers found that satisfaction is the main predictor of the actual use of the application (in their research is m-banking), user satisfaction is achieved through the experience of use so that users will not use an application if they are not satisfied with the application [32].

The result of H_{14} indicates that the intention of users to use e-wallets does not affect the adoption of e-wallet applications. The results obtained are different from Chaterjee et al, Qu et al, Sharma et al, and Yang et al research [21], [32], [35], [38], which found that the intention to use variable has a significant positive effect on the adoption of e-wallet.

6. MANAGERIAL IMPLICATIONS

Perceived security has a significant positive effect on the intention to use (H_8), which proves that in digital financial transactions, the perceived security by users has an important influence on their intention to use digital financial transaction applications (in this research is an e-wallet). Therefore, e-wallet service providers need to pay more attention to the security of their systems to prevent the leakage of user data, which can be misused by certain parties. They must implement multi-factor authentication, such as a password, phone number, email, and biometrics; use encryption technology in the process of storing user data, especially passwords; and implement a system that can detect threats and provide a quick response to sudden attacks.

Information quality has a significant positive effect on perceived trust (H_2), satisfaction (H_5), and intention to use (H_9), which proves that in digital financial transactions, the quality of the information provided by e-wallet service providers has an influence that is important to gain trust, satisfaction, and intention to use digital financial transaction applications (in this research is an e-wallet) from users. Therefore, e-wallet service providers must make greater efforts to determine which information should be provided to users and to represent it in the best way possible. They must provide accurate, timely, complete, relevant, and consistent information through official apps, websites, and social media; provide features that make it easier for users to monitor and manage their digital financial transactions in real-time; and ensure the accuracy of the information provided to users.

System quality has a significant positive effect on perceived trust (H_3), satisfaction (H_6), and

intention to use (H_{10}), which proves that in digital financial transactions, the quality of the system provided by e-wallet service providers has a significant influence that is important to gain trust, satisfaction, and intention to use digital financial transaction applications (in this research is an e-wallet) from users. Therefore, e-wallet service providers need to work to improve the ease of use, functionality, and reliability of the e-wallet system. They must perform regular system updates and repairs to ensure optimal system performance; develop features and user interfaces that facilitate and enhance the user experience; and ensure the system can be accepted and used by users.

Service quality has a significant positive effect on perceived trust (H_4), satisfaction (H_7), and intention to use (H_{11}), which proves that in digital financial transactions, the quality of the information provided by e-wallet service providers has an influence that is important to gain trust, satisfaction, and intention to use digital financial transaction applications (in this research is an e-wallet) from users. Therefore, e-wallet service providers need to be able to guarantee services that are professional and have high levels of empathy and responsiveness so that they can be relied on to provide added value to users. They must train customer service representatives to listen, understand, and handle problems properly; provide chatbots that can answer questions automatically; and ensure that the services provided to users are acceptable and always work optimally.

Perceived trust has a significant positive effect on the adoption of e-wallet (H_{12}), which proves that in digital financial transactions, the trust felt by users has an important influence on their ability to use digital financial transaction applications (in this research is an e-wallet). Therefore, e-wallet service providers need to always maintain the trust that has been obtained from current users and increase that trust in the future. They must maintain the confidentiality of user data and information; receive and follow up on user complaints and suggestions in a transparent manner; and commit to always prioritizing the interests of their users.

Satisfaction has a significant positive effect on the adoption of e-wallet (H_{13}), which proves that in digital financial transactions, user satisfaction has an important influence on their ability to use digital financial transaction applications (in this research is an e-wallet). Therefore, e-wallet service providers need to pay attention to the satisfaction of their users. They must conduct regular surveys to see if their needs have been met; make improvements and provide solutions if the dissatisfaction is obtained; and ensure all aspects of the e-wallet application are running properly.

7. LIMITATIONS AND FUTURE RESEARCH

The limitations of this research may provide opportunities for further research. First, this research was only conducted in Indonesia, specifically Jakarta, so future research can choose a different nation or area to get different research findings. Second, although only three objects—OVO, Linkaja, and DANA—are used by researchers, future research can make use of other research objects. Third, there were a limited number of respondents in this research, so the sample size of 401 may not be representative of the total population and cannot reflect the behavior of all e-wallet users. As a result, future research can broaden the sample size examined. Fourth, these research respondents are all e-wallet users; therefore, future research can select respondents from among e-wallet users and non-users to compare how various factors affect the two groups. Fifth, as the majority of the sample in this research, is between the ages of 17 and 25, future research can be expanded to include multi-group analyses of various age ranges and gain a deeper understanding of adoption behavior. Sixth, because this research only collected data for a month, future research can collect data for longer periods and include more respondents. Seventh, there is a hypothetical relationship that does not reflect reality in everyday life. Therefore, if further research is required, the model can be modified to incorporate additional characteristics.

8. CONCLUSIONS

Several factors influence users to adopt e-wallets in Indonesia (DKI Jakarta) based on research that has been conducted with reference to the Updated Delone and McLean IS Success Model, which has been modified and involves 401 respondents who are users or at least have made digital financial transactions at least once using an e-wallet application in the form of OVO, LinkAja, or DANA. The analysis of research data was carried out using Partial Least Square Structural Equation Modeling (PLS-SEM) in SmartPLS 4 software, which consisted of 14 hypotheses studied and included variables for perceived security, information quality, system quality, service quality, perceived trust, satisfaction, intention to use, and adoption of e-wallets. The results found that 1 indicator of the adoption of e-wallet variable with the

AoE3 code was invalid, while the rest were valid and reliable based on the results of the validity and reliability tests. For the results of hypothesis testing, it was found that there were 12 hypotheses accepted and 2 hypotheses rejected. In short, information quality, system quality, and service quality have a significant effect on perceived trust. On the contrary, perceived security has no significant effect on perceived trust. Then, information quality, system quality, and service quality also have a significant effect on satisfaction. Moreover, perceived security, information quality, system quality, and service quality have a significant effect on the intention to use. Lastly, perceived trust and satisfaction have a significant effect on the adoption of e-wallet. However, the intention to use has no significant effect on adoption of an e-wallet.

9. RECOMMENDATIONS

As a result, this research enriches the existing literature, particularly in the context of developing countries, namely Indonesia. The research's findings can serve as a guide for e-wallet service providers to:

1. Prioritize the security of data and information from users by ensuring that the e-wallet application system has a high level of security and provides a commitment to continue protecting user's data and information.
2. Provide information that is accurate, timely, complete, relevant, and consistent with a good, correct, clear, and transparent delivery process regarding the services and products provided to users.
3. Ensure that the e-wallet application system is reliable by maintaining system performance to be acceptable and provide the best experience for users.
4. Provide professional, responsive, and quality services by ensuring that users can access services easily and get the expected help.
5. Maintain the trust that has been obtained from current users and increase their trust in the future by committing to always providing the best service for users.
6. Focus on user satisfaction by ensuring that the services received are under the expectations and needs of users.

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ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

Table 5 : Loading Factor

Variables	Indicators	Code	Loading Factor 1	Loading Factor 2
Perceived Security	I feel safe when providing personal information when making payments with e-wallet applications	PS1	0.877	0.877
	I will not worry about the security of financial transactions on the e-wallet application	PS2	0.880	0.880
	In my opinion, the e-wallet application has sufficient technical capabilities to ensure that the data sent will not be intercepted by third parties or hackers	PS3	0.839	0.839
Information Quality	The information provided on the e-wallet application is relevant to my needs	InQ1	0.860	0.860
	The information available on the e-wallet application is easy to understand	InQ2	0.822	0.822
	Information available on the e-wallet application accurate	InQ3	0.829	0.829
System Quality	The system on the e-wallet application works quickly in loading transactions	SyQ1	0.855	0.855
	The system on the e-wallet application is easy to use	SyQ2	0.855	0.855
	The system on the e-wallet application is easy to navigate	SyQ3	0.835	0.835
Service Quality	Service representatives have sufficient knowledge to answer questions regarding e-wallet applications	SeQ1	0.867	0.867
	The e-wallet app provides a reliable service	SeQ2	0.848	0.848
	The e-wallet application provides a professional service	SeQ3	0.865	0.865
Perceived Trust	E-wallet application service providers always pay attention to the best interests of their customers	PT1	0.839	0.840
	E-wallet application service provider will act ethically when capturing, storing, processing and managing my personal data	PT2	0.854	0.854
	E-wallet application service providers follow consumer laws	PT3	0.822	0.820
Satisfaction	I am satisfied with the e-wallet feature	Sat1	0.841	0.841
	I am satisfied because the e-wallet application meets my needs	Sat2	0.852	0.852
	I am satisfied with my overall experience using the e-wallet application	Sat3	0.835	0.835
Intention to Use	I am open to using the e-wallet application as my main payment method in various transaction processes	ITU1	0.812	0.813
	I intend to use the e-wallet application in my daily life	ITU2	0.837	0.837
	I intend to use the e-wallet app in the future	ITU3	0.832	0.831
Adoption of E-Wallet	I often use the e-wallet app to transfer and send money	AoE1	0.868	0.890
	I often use the e-wallet application to make payment	AoE2	0.867	0.876
	On average, how often do you use your e-wallet in 1 month? : dropped	AoE3	**0.601**	-

Table 6 : Cross Loadings

Variables	Code	PS	InQ	SyQ	SeQ	PT	Sat	ITU	AoE
Perceived Security	PS1	**0.877**	0.716	0.713	0.720	0.655	0.686	0.682	0.627
	PS2	**0.880**	0.737	0.717	0.758	0.705	0.712	0.699	0.651
	PS3	**0.839**	0.708	0.718	0.725	0.704	0.694	0.666	0.612
Information Quality	InQ1	0.690	**0.860**	0.716	0.703	0.704	0.717	0.671	0.615
	InQ2	0.678	**0.822**	0.706	0.703	0.682	0.697	0.656	0.584
	InQ3	0.722	**0.829**	0.675	0.699	0.664	0.693	0.680	0.640
System Quality	SyQ1	0.724	0.669	**0.855**	0.742	0.758	0.752	0.719	0.667
	SyQ2	0.672	0.714	**0.855**	0.694	0.705	0.753	0.713	0.613
	SyQ3	0.709	0.747	**0.835**	0.687	0.678	0.695	0.673	0.609
Service Quality	SeQ1	0.736	0.719	0.691	**0.867**	0.713	0.745	0.706	0.614
	SeQ2	0.731	0.720	0.723	**0.848**	0.715	0.707	0.686	0.636
	SeQ3	0.723	0.724	0.740	**0.865**	0.723	0.694	0.697	0.651
Perceived Trust	PT1	0.710	0.696	0.700	0.724	**0.840**	0.686	0.653	0.652
	PT2	0.692	0.708	0.715	0.718	**0.854**	0.705	0.694	0.674
	PT3	0.592	0.647	0.703	0.649	**0.820**	0.706	0.696	0.580
Satisfaction	Sat1	0.679	0.703	0.742	0.675	0.719	**0.841**	0.686	0.650
	Sat2	0.676	0.670	0.730	0.700	0.703	**0.852**	0.728	0.626
	Sat3	0.681	0.749	0.715	0.728	0.683	**0.835**	0.708	0.609
Intention to Use	ITU1	0.669	0.669	0.696	0.685	0.698	0.698	**0.813**	0.649
	ITU2	0.663	0.681	0.699	0.674	0.668	0.719	**0.837**	0.590
	ITU3	0.619	0.628	0.655	0.646	0.644	0.661	**0.831**	0.501
Adoption of E-Wallet	AoE1	0.673	0.670	0.683	0.658	0.699	0.673	0.616	**0.890**
	AoE2	0.610	0.622	0.627	0.642	0.641	0.643	0.630	**0.876**

Table 7 : Hypotheses Test Result

Hypotheses	T-Statistics	P-Value	Result
Perceived Trust			
H_1 PS -> PT	**1.216**	**0.224**	**Not significant and rejected**
H_2 InQ -> PT	4.061	0.000	Significant and accepted
H_3 SyQ -> PT	6.387	0.000	Significant and accepted
H_4 SeQ -> PT	5.509	0.000	Significant and accepted
Satisfaction			
H_5 InQ -> Sat	5.904	0.000	Significant and accepted
H_6 SyQ -> Sat	8.777	0.000	Significant and accepted
H_7 SeQ -> Sat	4.679	0.000	Significant and accepted
Intention to Use			
H_8 PS -> ITU	1.990	0.047	Significant and accepted
H_9 InQ -> ITU	3.179	0.001	Significant and accepted
H_{10} SyQ -> ITU	6.401	0.000	Significant and accepted
H_{11} SeQ -> ITU	3.901	0.000	Significant and accepted
Adoption of E-Wallet			
H_{12} PT -> AoE	6.469	0.000	Significant and accepted
H_{13} Sat -> AoE	4.551	0.000	Significant and accepted
H_{14} ITU -> AoE	**1.953**	**0.051**	**Not significant and rejected**

Note: InQ: Information Quality; SyQ: System Quality; SeQ: Service Quality; Sat: Satisfaction; PT: Perceived Trust; PS: Perceived Security; ITU: Intention to Use; AoE: Adoption of E-Wallet;