

# Integration of Technology Acceptance Model and Theory of Planned Behaviour of Intention to Use Electronic Money

Heddy Friadi<sup>1</sup>, Ujang Sumarwan<sup>2</sup>, Kirbrandoko<sup>3</sup>

Bogor Agricultural University, Indonesia

**Abstract:** *This study is to examine the factors that affect attitudes toward using and intention to use server-based or smartphone-based electronic money as a means of transaction. The factors to be analyzed are perceived usefulness, perceived ease of use, product knowledge, attitude, subjective norms and perceived behavioral control. This research uses combined model of technology acceptance model (TAM) and theory of planned behavior (TPB) with product knowledge as an additional variable. The research data was obtained by distributing questionnaires to 143 respondents. Partial Least Square - Structural Equation Modeling (PLS-SEM) through SmartPLS software is used to analyze the data. The results show that attitudes toward using of smartphone-based electronic money is affected by perceived usefulness and perceived ease of use. Attitudes, subjective norms and perceived behavioral controls affect the intention to use smartphone-based e-money. Smartphone-based electronic money with the most recent smartphone tool was introduced in the country compared to other banking products even compared to chip-based electronic money. As a relatively new product, massive promotion strategy becomes a necessity. Issuers to engage in more focused marketing strategies by reaching market targets that can increase awareness and public intention to use smartphone-based electronic money.*

**Keywords:** e-Money, Intention, SEM, TAM, TPB

## 1. Introduction

The development of technology, especially in the field of communication such as internet and cellular phone is growing so rapidly and has multiplier effect, which means technological progress causes progress in other fields, one of them is payment system (Sumarwan, 2014). The emergence of new innovations is able to present a variety of access banking channels previously unthinkable. Access channels that usually shaped as office or outlet has now turned into electronic media such as ATM, or even gadgets like the Phone Banking, Internet Banking and Mobile Banking facility. Technological progress is very influential in significantly changing consumer behavior (Sumarwan, 2014) thus innovation develops following changes in consumer behavior. Innovations that arise from the need to seek alternative solutions to some of the problems faced by the Indonesian government, central bank and The Financial Services Authority (OJK) are: financial inclusion and cash transactions habits.

The World Bank survey results in 2014 show that only about 36% of adult citizens in Indonesia have bank accounts ([www.worldbank.org](http://www.worldbank.org)). The next issue relates to the cash transactions habits. People still feel more comfortable transacting in cash since it is physically visible, but the effort and risk of the transaction in cash is much larger (Wolman, 2012). Related to the issues, central bank and the government are launch: (1) Branchless Banking or Digital Financial Services for financial inclusive solution and (2) Less Cash Society (LCS) program called *Gerakan Nasional Non Tunai* (GNNT) (National Program for Non Cash-Transactions). People are encouraged to shift their transaction from cash to non-cash by means of electronic transactions.

Several commercial banks, cellular operator companies and fintech companies in Indonesia respond positively to launch electronic money (e-money). There are 2 types of electronic money; chip-based that is usually shaped in cards and server-based which by means a mobile phone facility. So far, the electronic money adoption is still dominated by the chip-based. An illustration can be seen by comparing the two types of electronic money from the two major bank based on 2016 of each annual reports: Bank Mandiri (9 millions chip-based vs. 3 millions server-based) and BCA (10 million chip-based vs. 160 thousand server-based).

When considering the number of active users of mobile phones in Indonesia which has reached 339 million (BPS-Statistic Indonesia, 2015), the adoption of server-based electronic money should be faster. However the launch of server-based electronic money does not necessarily accepted as an alternative means of non-cash transactions. there are other factors that encourage, influence or determine the intention of consumers to use server-based electronic money as a means of transaction. Previous studies have shown that the causes of failure to adopt up-to-date technology are more on behavioral aspects. Accepting or refusing to use the system is a behavior (Jogiyanto, 2008). Therefore, it is necessary to know the factors that affect consumer behavior, especially the intention to use server-based or smartphone-based electronic money.

This study aims to identify the factors that affect attitudes toward using and intention to use server-based electronic money that use smartphone application. Researchers will use an integration of TAM and TPB and product knowledge as an additional variable to analyze the factors which affect the intention to use of electronic money as a means of transaction. TAM is a model that used very influential and commonly used in information technology systems to describe the individual acceptance of the use of information

systems introduced by Davis (1989). There are two major predictors that influence the attitudes and intentions in TAM: perceived usefulness and perceived ease of use. TPB is a model that estimates consumer interest or intention to perform a behavior or action (Sumarwan, 2014). TPB was developed by Ajzen (1991) which is a refinement of Theory of Reasoned Action (TRA). There are three major predictors affecting the intentions of individuals to perform a behavior, the attitude toward behavior, subjective norms of behavior, and perceived behavioral control (Ajzen, 1991). In the development of information technology, both theories are widely used as predictors for acceptance and to know the behavior of an information technology object either separately or combined (Indrayana, 2015).

## 2. Literature Review

There are several studies that used as reference in this study. Rahmatsyah (2011) conducted a study which aims to analyze the factors that affect intention to use electronic money as a new product category for means of payment in Indonesia, with raised the case study of Flazz card BCA. This study integrates the TAM and TPB. The results conclude that the attitude toward using of Flazz card BCA is influenced by perceived usefulness.

The study by Taylor and Todd (1995) showed that perceived ease of use is a significant predictor of the attitude toward using of Computing Resources Center (CRC) at the inexperienced group. Similarly, the results of research by Rahayu et. al (2015) on IKPIA Perbanas students concluded that perceived ease of use of use positively affect the attitude toward using of e-banking services.

Kusuma and Untarini (2014) research to 110 respondents visitors WTC Surabaya shows that product knowledge has a positive and a significant influence on intention to purchase iPhone 5. This conclusion differs from Candraditya & Idris (2012) where product knowledge has the smallest positive regression results so that the product knowledge is a factor that does not have a significant influence to generate intention to use BCA Flazz card.

Sentosa & Kamaliah (2012) as well as Azriani et. al (2013) use the same method and same model; the integration of TAM and TPB model and SEM methods, but different conclusions which states that subjective norms significantly influence on the intention in online shopping while Azriani et. al (2013) concluded that the subjective norms does not affect the behavioral intention to use the new software of the employee of Rural Banks (BPR) in Malang.

The development of perceived behavioral control hypotheses in the context of information technology systems defined by Taylor and Todd (1995) as the constructs of internal and external behavior. These controls reflect past experiences and also anticipate the constraints. Several studies have shown that perceptual behavior control influences the interest of using information technology. The study, is a research conducted by Yaghoubi and Bahmani (2010) examines the factors that influence online banking adoption in Isfahan Province, Iran. Mathieson et al. (2001) developed the TAM model by adding a relationship to the extent to

which an individual considers itself to have the resources necessary to use the technology. Nevertheless Indrayana (2016) concluded the different results in which perceived behavioral control does not affect the intention of using Instagram to make online purchases.

Amoroso & Watanabe (2012) research stated that Japanese consumers have a positive attitude that underlies a strong intention to use Mobile Suica. Kurniawan et al. (2013) research about intention of BCA Surabaya branches customers to use mobile banking services also support such a conclusion. The different results was concluded by Taylor and Todd (1995), mentions that attitude has no influence on the behavioral intention of both experience and unexperience groups of users.

## 3. Research Methods

### 3.1. Design, Source of Data and Sampling Technique

This study was designed using a descriptive quantitative approach carried out through a survey with cross sectional study. The research was conducted from April to September 2017. The location of the research was in several major cities in Indonesia such as Jakarta, Bogor, Depok, Tangerang, Bekasi and Bandung.

Data used in this research are primary data and secondary data. Primary data obtained by conducting a survey directly to the respondents through the distribution of online questionnaires sent via email or WhatsApp. The secondary data was obtained through the collection of articles from these, journals, books, magazines, and websites related to this research.

The sampling technique used in this study was a non-probability sampling- convenience sampling. Non-probability sampling is the structured sampling so it does not provide equal opportunities for every member of population to be selected into the sample, while convenience sampling is a sampling technique based on the consideration of researchers to ease so that it can be done at any time (Malhotra, 2007). The samples used refers to the method of analysis Partial Least Square (PLS)-SEM that do not require large amounts of samples, the recommended minimum is between 30 to 100 (Latan & Ghozali, 2012). This study used a sample of 143 people.

### 3.2. Variables Description

This research model has 7 latent variables with 38 indicator / observed variable. To test the hypothesis of this study, the 7 variables are measured using instruments in the form of a questionnaire containing questions which represent indicators. Measurements of each indicator / variables was observed using a Likert scale of 1 to 5, where 1 indicates strongly disagree and 5 indicates strongly agree, except indicators of product knowledge where 1 indicates wrong answer & 5 indicates right answer. The research in each variables are described in Table 1.

**Table 1:** Definition of Variables

Latent Variables	Dimension	Indicator Symbols
Product Knowledge (PK)	-	X11 to X19
Perceived Usefulness (PU)	-	X21 to X25
Perceived Ease of Use (PEU)	-	X31 to X33
Subjective Norms (SN)	Normative Beliefs	X41 to X43
	Motivation to comply	X44 to X46
Perceived Behavioral Control (PBC)	Control beliefs	X51 to X53
	Control factors	X54 to X56
Attitude Toward Using (ATU)	Behavioral beliefs	Y11 to Y13
	Outcome evaluations	Y14 to Y16
Intention to Use (ITU)	-	Y21 to Y23

**3.3. Data analysis method**

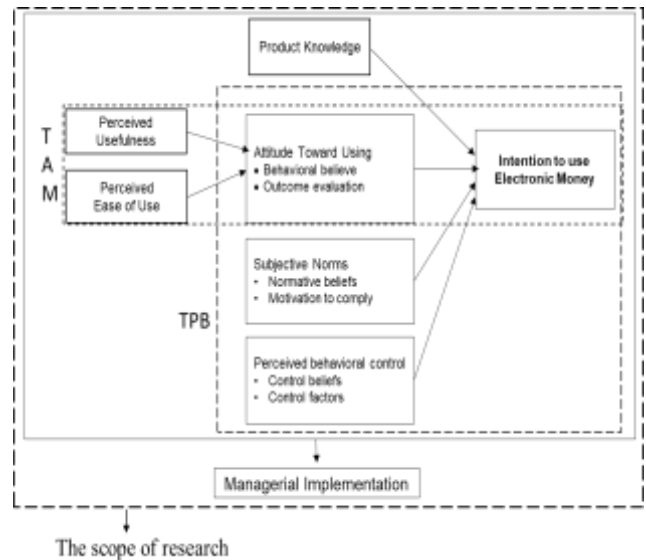
The analytical method in this study use Partial Least Square Structural Equation Modeling (PLS-SEM) method. According to Jaya and Sumertajaya (2008) and Latan and Ghozali (2012), PLS is a powerful analytical method because it can be applied to any data scale, does not require many assumptions and the sample does not have to be large.

The steps of PLS-SEM according to Hair et al. (2011) are as follows: designing the inner model, designing the outer model, constructing the path diagram, converting the path diagram into the equation system, Estimation (weight estimate, path estimation, means and location of parameters), evaluation of criteria (goodness of fit: validity test, reliability test & inner model), and hypothesis testing. Validity test can be seen from the loading factor for each indicator constructs. Rule of thumb is commonly used to assess convergent validity value loading factor 0.6 - 0.7 for research that is exploratory. However, to study the early stages of development scale of measurement, the value of the loading factor of 0.5-0.6 is considered sufficient (Chin, 1998). This research will use value of the loading factor of 0.6. Rule of thumb goodness of fit and hypothesis testing are described in Table 2.

**Table 2:** Rule of Thumb Goodness of Fit

Validity test	Reliability	Inner Model Test	Hypotheses test
Loading factor >0,6 AVE > 0,5	Composite Reliability CR > 0,6	$R^2 > 0.67$ (strong), $R^2 > 0.33$ (moderate), $R^2 \leq 0.19$ (weak)	T statistic $\geq 1,96$

The conceptual framework of this study is illustrated in Figure 1.



**Figure 1:** Conceptual framework

**4. Result and Discussion**

**4.1. Demographic Characteristic**

The distribution of male respondents as much as 60 percent of female respondents as much as 40 percent. This shows enthusiasts of electronic money is dominated by men. The majority of respondents as much as 97 percent have undergraduate education background. According to Sumarwan (2014), the level of education is one of the factors that influence the decision process and consumption patterns of people.

**4.2. Outer Model Measurement**

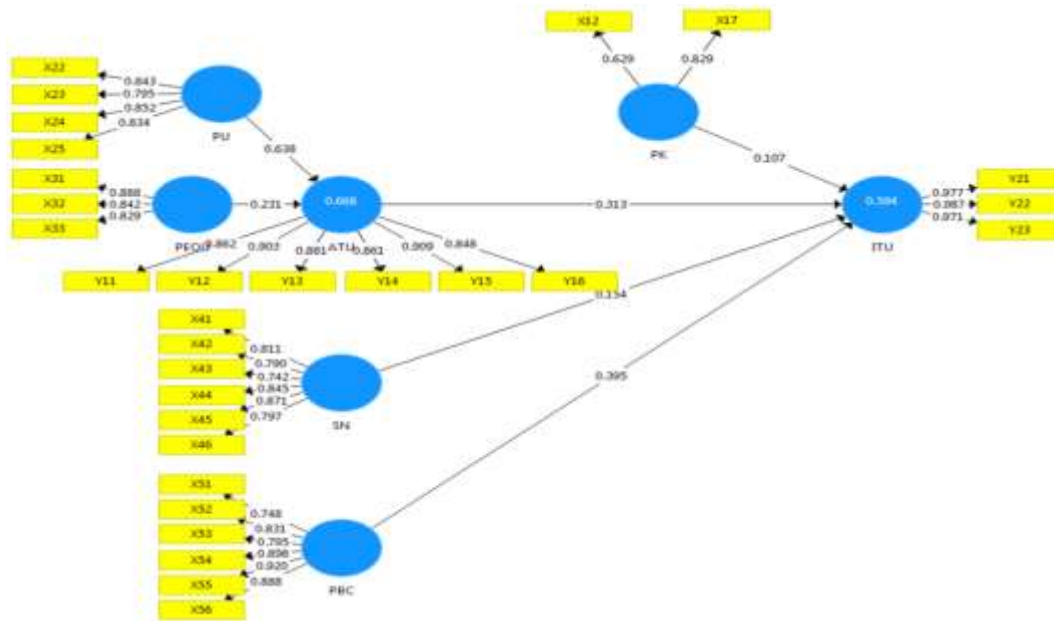
The results of the initial model testing through software run on the Smart PLS algorithm indicate that there are several indicators that have loading factor <0.6 ie X11, X13, X14, X15, X16, X18, X19 and X21. In addition there is an AVE value <0.5 and CR <0.6 for the latent variable Knowledge Products. Based on these results, the model have to be retested by eliminating all non-qualify indicator variables (Latan & Gozali, 2012).

Retesting after eliminating all non-qualify indicator variables showed a significantly different result as presented in Table 3 and Figure 2. All of indicator variables have loading factor values > 0.6 and AVE for all latent variables > 0.5 which means that this model qualifies to the convergent validity. Next measurement the discriminant validity by comparing the square root AVE ( $\sqrt{AVE}$ ) for each latent variable with the correlation value between the latent variables in the model. The result of the measurement of discriminant validity gives the result that the whole  $\sqrt{AVE}$  is greater than the correlation value between the latent variables in the model which means that this measurement model satisfies the discriminant validity requirement. Based on these two results it can be concluded that the outer model is valid.

The next test is the reliability test to prove the consistency and accuracy of the instrument in measuring latent variables indicated by the CR value of each latent variable. The test

results show that all latent variables have CR value > 0.6 so it can be concluded that outer model is reliable. According to

these validity and reliability results, this adjusted outer model can be concluded as the final model.



**Figure 2:** Loading Factor of the Outer Model

**Table 3:** Convergent Validity and Reliability of the Outer Model

Latent Variables	AVE	Composite Reliability
Product Knowledge	0.542	0.699
Perceived usefulness	0.691	0.899
Perceived Ease of Use	0.728	0.889
Subjective Norms	0.657	0.920
Perceived Behavioral Control	0.721	0.939
Attitude Toward Using	0.770	0.953
Intention to use	0.958	0.985

**4.3. Inner Model Test**

The inner model test generates value of R<sup>2</sup>. Attitudes toward using of electronic money generates an adjusted R<sup>2</sup> at 66.3% means that the diversity of attitudes toward using of

smartphone-based electronic money can be explained by exogenous factors by 66.3%, while the remaining 34.7% explained by other factors outside the model. Intention to use smartphone-based electronic money generates an adjusted R<sup>2</sup> is 58.2% means that the diversity of intention to use smartphone-based electronic money can be explained by the model by 58.2%, while the remaining 41.8% explained by other factors outside the model.

**4.4. Hypothesis Test**

Hypothesis testing is done by bootstrapping on the final outer model to see the value of T-statistics on every track of endogenous variables to exogenous variables as shown in Table 4.

**Tabel 4:** Hypothesis Test Result

	Loading Factor	T Statistics	P Values
Subjective Norm => Intention to use	0.154	1.959	0.051
Product Knowledge => Intention to use	0.107	2.084	0.038
Perceived ease of use => Attitudes toward using	0.231	2.552	0.011
Perceived Behavioral Control => Intention to use	0.395	4.000	0.000
Perceived usefulness => Attitude toward using	0.638	6.950	0.000
Attitudes toward Behavior => Intention to use	0.313	2.848	0.005
Perceived ease of use => Attitudes toward using => Intention to use	0.231 x 0.313 = 0.072		
Perceived usefulness => Attitudes toward using => Intention to use	0.638 x 0.313 = 0.199		

The data in Table 7 shows that almost the whole track has a significant influence where T-statistic ≥ T-table 1.96 at 5% significance level. While the track is at the threshold of the T-statistics ≈ T-Table 1.96. These results can be concluded that there is a significant influence.

Perceived usefulness have a very significant influence on attitudes toward the use of electronic money behavior because the T-statistics reach a value of 6,950 well above the minimum limit of 1.96 with the path of the coefficient

(loading factor) of 0.638. This means H1 is supported. Perceived usefulness also have an indirect effect on intention to use smartphone-based electronic money with a loading factor of 0.199.

Perceived ease of use has a significant influence on attitude toward using of electronic money behavior because T-statistics reach a value of 2.552 greater than the minimum limit of 1.96 with a loading factor of 0.231. This means that H2 is supported. Perceived ease of use also has an indirect

effect on intention to use smartphone-based electronic money with a loading factor of 0.072.

Product knowledge has a significant influence on intention to use smartphone-based electronic money because T-statistics reach 2.084 points greater than the minimum limit of 1.96 with a loading factor of 0.107. This means that H3 is supported.

Subjective norms have a significant influence on intention to use smartphone-based electronic money due to T-statistic  $\approx$  T-table 1.96 with loading factor of 0.154. This means H4 is supported.

Perceived behavioral control control has the most significant influence on intention to use smartphone-based electronic money because the T-statistics reach a value of 4,000 much greater than the minimum limit of 1.96 with a loading factor of 0.395. This means H5 is supported.

Attitudes toward behavior have a very significant influence on intention to use electronic money because T-statistics reach a value of 2.848 far greater than the minimum limit of 1.96 with a loading factor of 0.313. This means H6 is supported.

## 5. Conclusion and Managerial Implication

Smartphone-based electronic money with the most recent smartphone tool was introduced in the country compared to other banking products even compared to chip-based electronic money. As a relatively new product, massive promotion strategy becomes a necessity.

Product knowledge became one of the variables in this study which gives a significant influence on the intention to use smartphone-based electronic money. Cash withdrawal without card in ATMs is the most dominant indicator variable that attracts the interest of respondents because of a new experience, however information about this feature is still rare. Attractive ads will accelerate information about these features to consumers. Attitudes toward using smartphone-based electronic money is influenced by the perceived usefulness and perceived ease of use. This attitude then gives effect to the intention to use smartphone-based electronic money.

Subjective norms give influence to the intention of respondents to use smartphone-based electronic money as a means of transaction. Suggestions and references from friends, colleagues and family provide confidence and motivation to use smartphone electronic money.

Perceived behavioral control gives the most significant influence to intention to use smartphone-based electronic money than other factors. This is closely linked to the availability of resources and self-efficacy as well as expectations of easy requirements that could encourage intention to use smartphone-based electronic money. The resources required are relatively within the grasp so as to be supported the habit of using applications on smartphones as well as the easy terms and conditions make perceived behavioral control gives the most significant positive effect.

Smartphone-based electronic money issuers is suggested to focus in marketing strategies by reaching target market that can increase awareness and public intention to use smartphone-based electronic money such as campus / school, *hangout* areas (such as café, restaurants, cinemas), online shopping and online transportation. In addition to always update the applications and features. The Government / Central Bank / FSA is expected to provide continuous promotion program so that it can support the program that has been declared: the financial inclusion and national cashless transaction program.

## 6. Future Scope

This study was limited to the intention of using smartphone-based electronic money, not to the actual using yet. The location of research areas (Jakarta and the surrounding cities) was other limitation. We propose for further research is focused on actual using of smartphone-based electronic money and with sample in other areas or regions.

## References

- [1] Ajzen I, Fishbein M. 1975. *Belief, Attitudes, Intention, and Behavior: An Introduction To Theory and Research*. Addison Wesley Publishing
- [2] Ajzen, I., 1991, The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50, pp 179-211.
- [3] Amoroso DL, Watanabe RM. 2012. Building a Research Model for Mobile Wallet Consumer Adoption: The Case of Mobile Suica in Japan. *Journal of Theoretical and Applied Electronic Commerce Research*, Vol 7 No.1, pp 94-110.
- [4] Azriani NR, Subroto B, Badriawan Z. 2013. Minat Keperilakuan Individu Menggunakan Piranti Lunak Sebagai Penunjang Pelaporan Keuangan. *Jurnal Akuntansi Multiparadigma* Vol 4 No 3, pp 330-507.
- [5] Bank Mandiri. Annual Report 2016. [Internet]. Available on <http://ir.bankmandiri.co.id/phoenix.zhtml?c=146157&p=irol-reportsAnnual>
- [6] BCA. Annual Report 2016. [Internet]. Available on <http://www.bca.co.id/id/Tentang-BCA/Hubungan-Investor/Laporan-Tahunan>
- [7] Badan Pusat Statistik (BPS). Jumlah Pelanggan Telepon Indonesia menurut Jenis Penyelenggaraan Jaringan, 2010-2015. [Internet]. Available on <https://www.bps.go.id/linkTabelStatis/view/id/1844>
- [8] Candraditya, Idris. 2013. Analisis Penggunaan Uang Elektronik (Studi Kasus Pada Mahasiswa Pengguna Produk Flazz BCA di Fakultas Ekonomika dan Bisnis Universitas Diponegoro). *Diponegoro Journal of Management* Vol 2 No 3, Tahun 2013, pp 1-11
- [9] Chin, WW. 1998. The partial least squares approach for structural equation modeling. *Modern Methods for Business Research*. pp 295 – 236. London (EG) : Lawrence Erlbaum Associates.
- [10] Davis FD. 1989. Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology. *MIS Quarterly*, Vol 13 No 3, pp 319-339.
- [11] Davis FD, Bagozzi RP and Warshaw PR. 1989. User Acceptance of Information Technology: A Comparison

of Two Theoretical Model. *Management Science*, 35, pp982-1002.

- [12] Ghozali I. 2012. Stuctural Equation Modeling Metode Alternatif dengan Partial Least Square (PLS). Semarang (ID): UNDIP.
- [13] Hair JF, Sarstedt M, Ringle CM, Mena JA. 2011. An Assessment of the Use of Partial Least Squares Structural Equation Modeling in Marketing Research. *Journal of the Academy of Marketing Science*, Vol 40 No 1, pp 414-433
- [14] Indrayana B, Seminar KB, Sartono B. 2016. Faktor Penentu Penggunaan Minat Instagram untuk Pembelian online Menggunakan Technology Acceptance Model dan Theory of Planned Behaviour. *Jurnal Aplikasi Bisnis dan Manajemen*, Vol 2 No 2, 138-147
- [15] Jaya IGNM, Sumertajaya IM. 2008. Pemodelan Persamaan Struktural dengan Partial Least Square. *Semnas Matematika dan Pendidikan Matematika*. Vol1 No1, pp 118-132.
- [16] Jogiyanto H. 2008. Sistem Informasi Keperilakuan Edisi Revisi. Yogyakarta (ID): Andi Offset
- [17] Kusuma ID, Untarini N. 2012. Pengaruh Pengetahuan Produk terhadap Niat Beli dengan Sikap sebagai Variabel Intervening. *Jurnal Ilmu Manajemen*, Vol 2 No 4, pp 1573-1583
- [18] Latan H, Ghozali I. 2012. Partial Least Squares: Konsep, Teknik & Aplikasi Smart PLS 2.0 M3. Semarang (ID): UNDIP.
- [19] Malhotra NK. 2007. Marketing Research: An Applied Orientation. Pearson Prentice Hall. US.
- [20] Mathieson, K. 1991. Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior. *Information System Research*. Vol 2: pp173-191.
- [21] Rahmatsyah. 2011. Analisa faktor-faktor yang mempengaruhi penggunaan produk baru (Studi Kasus: Uang Elektronik Kartu Flazz BCA) [tesis]. Jakarta (ID). Universitas Indonesia.
- [22] Sentosa I, Kamariah NNM. 2012. Examining a Theory of Planned Behaviour (TPB) and Technology Acceptance Model (TAM) in Internet Purchasing Using Structural Equation Modeling. *Researchers World-Journal of Arts & Science*, Vol.3, Issue 2(2).
- [23] Sumarwan U, et. al. 2015. Pemasaran Strategik; Perspektif Perilaku Konsumen dan Marketing Plan. Bogor (ID): Penerbit IPB Press.
- [24] Sumarwan U. 2014. Perilaku Konsumen; Teori dan Penerapannya dalam Pemasaran. Bogor (ID): Penerbit Ghalia Indonesia.
- [25] Taylor S, Todd P. 1995. Understanding Information Technology Usage: A Test of Competing Models. *Information System Research*, Vol 6 No1, pp 167-187.
- [26] Wolman D. 2012. The End of Money: Counterfeiters, Preachers, Techies, Dreamers--and the Coming Cashless Society. Philadelphia (US): Da Capo Press.
- [27] Yaghoubi NM, Bahmani E. 2010. Factor Affecting the Adoption of Online Banking an Integration of Technology Acceptance Model and Theory of Planned Behavior. *International Journal of Business and Management*, Vol 5 No 9, pp 159-165.

## Author Profile

**Heddy Friadi** received S1 degrees in Management from Padjadjaran University in 1994 and Magister degree in Business from Bogor Agricultural University in 2017. He works in Bank Mandiri, an Indonesian Government owned commercial bank. ghu