

# Understanding 3G Mobile Service Acceptance in Ho Chi Minh City, Vietnam

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## Abstract

The rapid development of telecommunication and Internet services enables smartphone users to access online services faster and create more demand for using high-speed data services. The third generation (3G) mobile services have become the pioneer for the trend of high speed data transmission for years. This study aims to explore the factors that affect behavioral intention of adopting 3G mobile telecommunications. After implementing a structural equation modeling to analyze the data collection of 223 self-administered correspondents, we found that perceived factors, including ease of use, usefulness and enjoyment have a significantly positive relationship with attitude and while the attitude is positively associated with behavioral intention to use 3G. Based on the results, the research enables us to propose several practical recommendations to 3G providers in Vietnam such as 3G providers should provide more interesting and entertaining contents in their 3G applications and services, which charge appropriate fees and are easy to use for customers. In addition, 3G providers should focus on customers' attitude by listening and receiving customers' feedbacks to improve 3G technological solutions and value-added services.

**Keywords:** 3G, behavioral intention, Vietnam, mobile service

## 1. Introduction

Nowadays, the rapid development of the Internet and wireless technologies drives to increase in high demand for users of faster data transmission. Consumers need high-speed data services for their smartphones, tablets or laptops so that they can access the Internet to implement a variety of online activities efficiently with more convenient ways. In the situation with high technology for connection of mobile phone, 3G technology has been the pioneer for the trend of high-speed data transmission for years.

3G is the third generation of mobile telecommunications technology, which is a set of standards used in mobile devices, telecommunication services and networks that complies with the International Mobile Telecommunications-2000 (IMT-2000) specifications by the International Telecommunication Union. 3G network provides faster data rates than the previous generation networks (1G and 2G). 1G regarded as the first generation operating analog technology provides a wide area low bandwidth just less than 10 kbps (kilobyte per second) in 1940s. At that time, only voice service was used. 2G stands for the second generation, established in the 1990s, provides data rates only between 10 and 20 kbps. Consumers used 2G for performing both voice communication and short message service (SMS) (Campbell & Schwartz, 2001). In the early stage of 3G mobile network, it can offer data rates of 144 Kbps for fast-moving mobile users in vehicles, 384 Kbps for slower moving pedestrian users, and 2048 kbps from fixed locations. However, 3G network system now can provide up to 14.4 Mbps transmission speeds with Universal Serial Bus (USB) 3G and enhance more diverse applications. Therefore, 3G mobile services become more and more widespread around the world with various applications brought to users of cellphones, smartphones, tablets and laptops with a huge variety of Internet services such as online music, online video, online game, video call, GPS, social networks and so forth.

Although other countries accepted 3G very soon, in Vietnam, the government has allowed providing 3G mobile services since 2009, which was the milestone in history of mobile network in Vietnam. However, the number of 3G users was still low at that time. The reason was that subscribing fee for 3G mobile services at that time was rather expensive and the telecom infrastructure for 3G technology had not developed completely to be ready to use. The situation has much more improved since 2012. According to the research of Nielsen above, in general,

3G has been fairly successful in Vietnam, especially the significance growth rate of 3G customers since 2012. Although there have been some problems existing such as high monthly charges and limited applications, many analysts believe that 3G market in Vietnam has many opportunities for developing, especially in content services and Internet-based services. Despite the successes and potentials of 3G mobile services in Vietnam, 3G customers are still not satisfied about service quality of network systems, which are becoming degraded for crowded users, fewer promotion programs and not good customer services of 3G providers. The development of 3G will become more dramatically if 3G providers solve current problems and continue to exploit new potentials of 3G services.

According to the situation of 3G market in Vietnam, investigating about acceptance of 3G with the view of Vietnamese consumers is really necessary. The main reason is that it will help 3G providers understand customers' perception more clearly as well as help them know which elements actually influence customers' decision to accept 3G mobile services. As a result, they will have good strategies to improve their service quality and attract more customers to accept 3G services as well as create loyalty customers.

In fact, the acceptance of 3G is not simple, and it is not just a matter of whether customers adopt or not adopt the technology, but it comprises many reasons that led to the acceptance and subscription (Chong, Darmawan, Ooi, & Lee, 2010). In this research, we replicated and modified previous research models to investigate what factors affect the intention to use 3G. Our model aims to test 5 main factors, including perceived usefulness (PU), perceived ease of use (PEOU), perceived enjoyment (PE), attitude (ATT) and behavioral intention to use (BITU). Specifically, we add demographic profile of respondents considered as control variables to the research model. By using structural equation modeling to test the research model, we find that PEOU has a strongly positive impact on PE, following on Attitude and then on PU. The findings are generally consistent with some previous studies. The results also illustrate that PU and PE have no direct effects on BITU, but they are positively associated with attitude, in turn; attitude has a strongly positive relationship with BITU. Specifically, the demographic variables have no significant correlation with BITU. The next section presents theoretical backgrounds and formulation of research hypotheses. The third section describes the research methodology with data analysis and estimated results. Discussions will be presented in section 4. Lastly, the fifth section summarizes our main findings and suggests some recommendations for 3G providers.

## **2. A Brief Literature Review**

### *2.1 3G Mobile Services*

The International Telecommunication Union (ITU) defined 3G of mobile telephony standards known as International Mobile Telecommunications-2000 to facilitate growth, increase bandwidth up to 14.4 Mbps transmission speeds and enhance more diverse applications. With its broader bandwidth, greater data speeds, increased capacity for packet voice and data, 3G creates new methods for cell phone users to communicate, assess information, implement new business and learn models such as online shopping and training, and mobile gaming and television.

Three main cell phone providers (MobiFone, Vinaphone, & Viettel) have introduced 3G in Vietnam since December of 2009. According to statistics of Ministry of Information and Communications of Vietnam, there are around 138.6 cellular subscribers and 27.5 million 3G subscribers by the end of 2014. Although the telecommunication industry in Vietnam has reformed through open this market for new entrants, three main providers still dominated the market. Specifically, by the end of 2013, Viettel accounted for 34.73% of the 3G market, the largest share of total 3G subscribers; the followers are MobiFone and Vinaphone with 33.19% and 29.71%, respectively. A number of 3G customers will increase in the future because 3G services are playing an important part of their daily life. Therefore, it is essential to understand what main factors that influence Vietnamese consumers' intention to use 3G mobile services are.

### *2.2 Factors Influence the Adoption of 3G*

Many previous studies have developed Technology Acceptance Model (TAM) of Davis (1989) to examine factors that influence customers' decision to adopt 3G technology. For instance, Liao et al. (2007) illustrated that Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) have a positive impact on attitude, which, in turn, influence behavioral intention. Additionally, they also showed Perceived Enjoyment (PE) played a major and essential role in users' acceptance of 3G services. Similarly, some other studies extended the TAM to investigate the relationship between PE with attitude, and in turn, behavioral intention to accept hand-held Internet devices (Bruner and Kumar, 2005) or to adopt a hedonic information system (Van Der Heijden, 2004). In another study, Chong et al. (2012) extended the TAM to incorporate demographic profile of users. They found that there is no difference in gender and age as using 3G services. However, customers with a higher educational level are more

likely to adopt 3G.

In fact, the TAM is one of the most commonly conducted models to explore information technology (IT) acceptance. In this paper, we extend the model of Liao et al. (2007) to examine what factors influence Vietnamese consumers to use 3G mobile services. According to the TAM, PEOU is defined as the “the degree to which a person believes that using a particular system would be free of effort.” From empirical studies, PEOU was considered as an essential factor that affects the acceptance of information technology (Igarria, Livari & Maragahh, 1995). PEOU was also viewed as “the individual’s perception of how easy the innovation is to learn and to use,” as a result of investigating employees’ decisions to use computers (Venkatesh, 2000). In general, the relationships between PEOU with PU and ATT have been empirically recognized in the IT literature. Some studies showed their findings were consistent with TAM results; that is, PEOU and PU have a positive relationship with attitude (Burton-Jones & Hubona, 2005; Igarria et al., 1997).

Davis (1989) defined PU as “the prospective user’s subjective probability that using a specific application system will increase his or her job performance within an organizational context.” Adams et al. (1992) reported that PU drove users to adopt computer systems. Other studies have also demonstrated that PU is possibly relevant with system usage (Thompson et al., 1991; Igarria et al., 1994). In terms of relationship between PU and attitude, some prior studies illustrated that the more usefulness of adopting a new technology; the greater potential customers would like to use it (Hung et al., 2003; Yang, 2005; Liao et al., 2007.)

Moon and Kim (2001) consider PE as a driven force of motivation in the technology acceptance process, implying that the implementation of an activity of adopting technology is perceived to be enjoyable. In fact, many entertainment activities provided by 3G mobile services are fun and enjoyable for subscribers such as online games, mobile TV, online music, e-books, and so on. The authors demonstrated that PE is positively associated with attitude towards using a specified source. Besides, Liao et al. (2007) also found out a consistent result.

The TAM posits that real usage of a particular system will be identified by a person’s behavioral intention, which is jointly identified by a person’s attitude towards adopting a system (Liao et al., 2007). In addition, based on a concept of attitude of Ajzen and Fishbein (1980), Robinson, Marshall & Stamps (2005) developed the measures of attitude. Moon and Kim (2001) also used the similar measures of attitude toward the research about the acceptance of World Wide Web (WWW). Furthermore, more extensive meanings of attitude were used to measure attitudes toward different technologies by other researchers. Attitude measures consisting of consumers’ perceptions of convenience, time and money saving, security and risks, and social contact were determined and demonstrated through a study of Chen et al. (2002). Yu et al. (2005) conducted the research measuring attitude toward T-commerce by asking consumers’ interests to the service and product information and perception.

Behavioral intention (BI) to use can be considered as a measure of the likelihood that a person will adopt the application meanwhile the TAM uses actual usage in order to represent a self-report calculation of time or frequency of adopting the application (Davis et al., 1989). However, in reality, it is too difficult to acquire an objective measurement of a user’s intention to disclose his or her behavior. Several studies have proven that both theoretical and empirical results exist for the strong relationship between intention to engage in a behavior and actual behavior (Dabholkar and Bagozzi, 2002; Vijayasathay, 2004). In this study, we define behavioral intention is considered as a customer’s intention to use 3G mobile services.

Based on the literature review, we posit the following hypotheses:

- H1: PEOU positively affects PU of 3G mobile services.*
- H2: PEOU has a positive effect on attitude towards using 3G mobile services.*
- H3: PEOU has a positive impact on PE of 3G mobile services.*
- H4: PU positively affects attitude towards using 3G mobile services.*
- H5: PU has a positive effect on behavioral intention to use 3G mobile services.*
- H6: PE positively affects attitude towards using 3G mobile services.*
- H7: PE has a positive impact on behavioral intention to use 3G mobile services.*
- H8: PE has a positive effect on PU of 3G mobile services.*
- H9: Attitude positively affects behavioral intention to use 3G mobile services.*

In addition, we add demographic profile of respondents including age and gender considered as control variables. Figure 1 presents a research model.

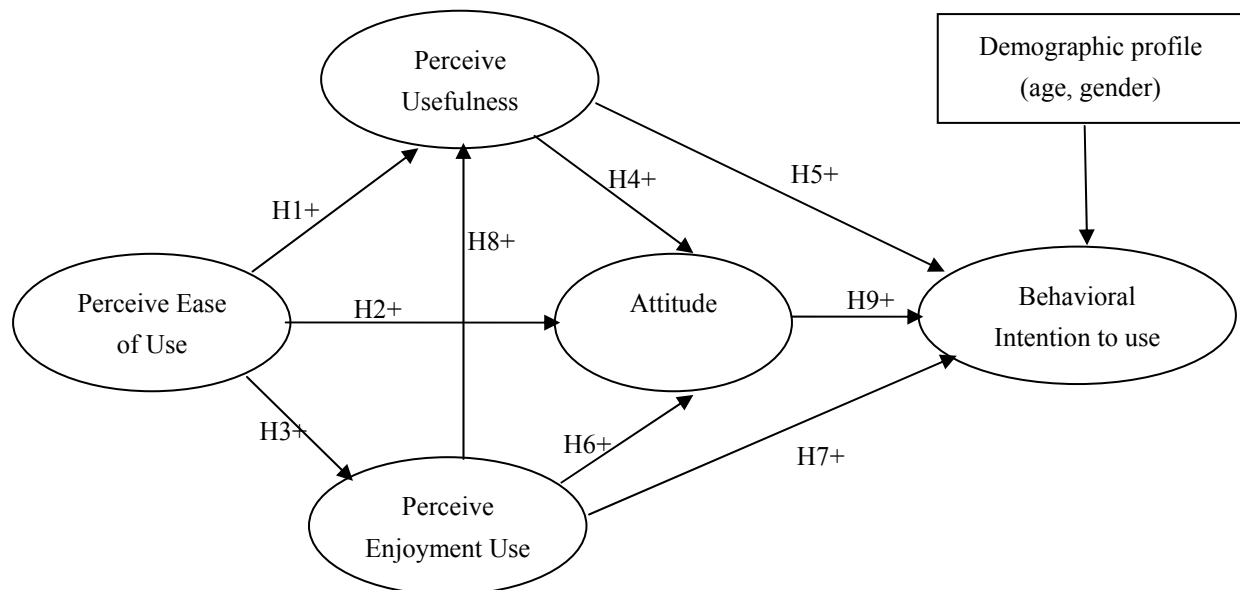


Figure 1. Research model

### 3. Method

We developed a survey questionnaire by following from previous measurement scales and translating into Vietnamese language, which makes respondents more comfortable. We conducted in-depth interviews with 15 persons who have been using 3G services to ask for reading the questionnaire and giving their feedbacks. The aim of this pilot test was to clarify the structure and content of the questionnaire as well as modify it appropriate in the Vietnamese context, which guaranteed that the questionnaire was clear and understandable before distribution of the questionnaire to respondents, who were living or working at Thu Duc district, Ho Chi Minh City (HCMC), Vietnam. According to the Statistic Office of HCMC in 2011, the total population of Thu Duc has 474.547 with 12 wards.

The questionnaire was designed to ask for respondents' acceptance and intention towards using 3G mobile services. We distributed the questionnaire directly to respondents and collected right after filling in it during two months from March to April of 2013 at 28 cafeterias close to the office buildings and Vietnam National University campuses in Thu Duc district. Concerning the minimum sample size requirements, there exists different points of view in previous researches about how large a sample could be to avoid bias and truly reflect the research situation. According to Anderson and Gerbing (1984) in their research about the suitable sample size for confirmatory factor analysis conducted in 1984, the sample size of 150 is enough for the result and the convergent process to be appropriate. After discarding 77 invalid responses, there were 223 qualified responses for analysis.

Table 1 presents some demographic characteristics of the respondents. The female respondents accounted for 53.4 percent (119 persons), and the rest was male. Moreover, 58.7 percent (131 respondents) were from 18 to 25 years old. Regarding occupation, the majority of the respondents was undergraduate students with 52 percent (116).

Table 1. Demographic characteristics of the respondents

Measure	Items	Frequency	Percentage
<b>Gender</b>	Male	104	46.6
	Female	119	53.4
<b>Age</b>	Under 18	36	16.1
	From 18 to 25	131	58.7
	From 26 to 35	31	13.9
	From 36 to 45	15	6.7
	Above 45	10	4.5
<b>Occupation</b>	High school students	34	15.2
	Undergraduate students	116	52
	Office staffs	61	27.4
	Owners of business	5	2.2
<b>Income</b>	Others	7	3.1
	Under 2 million VND	80	35.9
	From 2 to 4 million VND	73	32.7
	From 4 to 6 million VND	33	14.8
	From 6 to 8 million VND	22	9.9
	Above 8 million VND	15	6.7

Source: Data.

Sample size= 223. Exchange rate (on June, 2013) = 20, 828.00 VND/US\$.

The independent and dependent variables used for this study are adapted from the prior ones. Table 2 illustrates descriptive statistics of selected items for the respective constructs and references. The questionnaire includes three sections. The first part asks respondents about their personal information, which 3G provider they have registered with and which type of 3G's multimedia applications they have used. The second section contains 27 main statements evaluated on a five-point Likert scale where 1-strongly disagree to 5-strongly agree. The last one is optional part which respondents can write their ideas about quality of 3G mobile services of their provider as well as their expectations to improve 3G services in the future.

#### 4. Results

After processing data and analyzing demographic profile, factors and their indicators were illustrated in Table 2. The PU has the means ranging from 3.61 to 3.89. The means of PEOU vary from 3.73 to 4.07. The means of PE range from 3.61 to 3.74. The means of attitude towards using 3G services range from 3.40 to 3.87. Finally, the means of BITU vary from 3.65 to 3.81.

Table 2. Descriptive statistics

Measurement scale		Mean	SD
<b>Perceived usefulness (Liao et al., 2007; Pagani, 2004; Chong et al., 2010; Kuo &amp; Yen, 2009)</b>			
PU1	Using 3G saves me time	3.74	1.014
PU2	3G increases the quality of communication	3.69	0.953
PU3	3G provides many necessarily useful services and applications in life	3.89	0.837
PU4	3G supports my life easier	3.77	0.900
PU5	The quality of my life is improved somehow thanks to using 3G	3.61	0.862
<b>Perceived ease of use (Liao et al., 2007; Teo &amp; Pok, 2003; Kuo &amp; Yen, 2009; Agarwal &amp; Prasad, 1997)</b>			
PEOU1	It is simple and easy to register 3G for my mobile phone with providers	4.00	0.937
PEOU2	3G-based services do not require many skills in order to get used to them	3.98	0.918
PEOU3	I learned to use 3G-based services quickly	4.07	0.844
PEOU4	3G-based services are understandable and clear	3.73	0.955
PEOU5	I believe that it is easy to get 3G-based services do what I want them to do	3.76	0.866

PEOU6	In general, it is easy to use 3G based-services	3.90	0.840
<b>Perceived enjoyment (Chong et al., 2010; Liao et al., 2007)</b>			
PE1	There are many fun and enjoyable 3G-based services	3.74	0.921
PE2	3G-based services make me really curious about them	3.73	0.896
PE3	Using 3G-based services is a good way to entertain	3.61	0.887
PE4	3G-based services guide me explore novelty that is not found in previous-generation mobile services	3.64	0.864
PE5	3G-based services help me have fun time with my family and my friends	3.74	0.922
<b>Attitude towards using 3G (Vijayasathy, 2004; Liao et. al, 2007)</b>			
ATT1	3G are really beneficial	3.87	0.724
ATT2	Fee of using 3G is acceptable	3.40	1.030
ATT3	Using 3G is a good idea	3.75	0.787
ATT4	Using 3G is worthy	3.67	0.803
ATT5	I have positive attitude with using 3G	3.69	0.794
ATT6	I highly evaluate values which 3G brings to me	3.61	0.796
ATT7	In general, I like using 3G for my mobile phone	3.78	0.859
<b>Behavioral intention to use (Liao et al., 2007; Chong et al., 2010)</b>			
BITU1	I am always willing to use 3G for my mobile phone	3.81	0.951
BITU2	I intent to use 3G for my mobile phone in the future	3.87	0.834
BITU3	I will try new services of 3G in the future	3.70	0.866
BITU4	I will recommend my family and my friends to use 3G for their phones	3.65	0.964

Source: Data.

Exploratory factor analysis (EFA) is used to reduce unsuitable variables and establish a simple structure of variables. According to Hair et al. (1998), factor loading is a criterion to ensure practical significance of EFA. The factor loading is regarded as gaining the minimum level if it is greater than 0.3, significance if it is greater than 0.4, and practical significance if it is larger than 0.5. Furthermore, we conduct the reliability test by calculating Cronbach's Alpha. Using Cronbach's Alpha aims to test the internal consistency reliability of measurement. Many researchers suggested that an alpha score of above 0.6 is generally acceptable (Slater, 1995; George & Mallery, 2003). The Corrected Item-Total Correlations help to identify the degree to which each indicator correlates with the total score. Pallant (2007) illustrates that a value less than 0.3 implies that the item is measuring something different from the whole scale. The "Cronbach's alpha if deleted" is evaluated to identify the effect of removing items from each sub-scale (Lemmens, 2010). The item whose Cronbach's alpha if the item deleted is larger than the overall Cronbach's alpha, and corrected item total correlation is less than 0.3 will be eliminated from the variable list.

Table 3 demonstrates Cronbach's alpha for each construct identified and used. All Cronbach's alpha values range from 0.803 to 0.875, which are greater than 0.6 are acceptable. As a result, the constructs are considered reliable and no item is deleted in this stage.

Table 3. Result of reliability test

Construct	Measurement items	Cronbach's alpha
Perceived usefulness	PU1, PU2, PU3, PU4, PU5	0.839
Perceived ease of use	PEOU1, PEOU2, PEOU3, PEOU4, PEOU5, PEOU6	0.875
Perceived enjoyment	PE1, PE2, PE3, PE4, PE5	0.850
Attitude	ATT1, ATT2, ATT3, ATT4, ATT5, ATT6, ATT7	0.869
Behavioral intention to use	BITU1, BITU2, BITU3, BITU4	0.803

Source: Data.

ATT1 was excluded from the measurement scale in the process of exploratory factor analysis (EFA). Implementing Confirmatory Factor Analysis (CFA) by using Analysis of Moment Structure (AMOS) is the next stage to identify the factor structure of the dataset. In the CFA, the factor structure which was extracted in the

EFA is confirmed. Specifically, it is used to test whether the consistence between measures of a construct and a researcher's understanding about the nature of that construct (or factor) occurs. Clearly, the aim of confirmatory factor analysis is to examine whether the data fits the hypothesized measurement model.

At the first-round step at this stage, ATT2 was discarded because of its low weight of 0.458, which is less than 0.5. After removing ATT2, the results of model-fit were acceptable: Chi-square= 311.819; Chi-square/df=1.223 (<5); Comparative Fit Index (CFI)= 0.979 (>0.9) ; Goodness-of-fit index (GFI)= 0.901 (>0.9); Tucker and Lewis Index (TLI)= 0.975 (>0.9); Root Mean Square Error Approximation (RMSEA)= 0.032 (<0.08)

In terms of Standardized Regression Weights, there were all weights, exceeding 0.5 and all had statistical significance (all  $p=0.000 < 0.05$ ). Table 5 presents the results of measurement model test by using CFA. Moreover, Composite Reliability (CR) of all factors ranged from 0.805 to 0.884 (>0.7) while Average Variance Extracted (AVE) ranged from 0.502 to 0.607 (>0.5). Therefore, the measurement model meets criteria for convergent validity. The statistical results of standardized loadings, composite reliability, variance extracted are listed in table 4.

Table 4. Results of measurement model test by using confirmatory factor analysis

Construct and indicators	Standardized Loadings	Composite reliability	Variance extracted	Numbers of Items <sup>a</sup>
<b>Perceived usefulness</b>		<b>0.835</b>	<b>0.507</b>	<b>5(5)</b>
PU1	0.700***			
PU2	0.758***			
PU3	0.828***			
PU4	0.633***			
PU5	0.619***			
<b>Perceived ease of use</b>		<b>0.863</b>	<b>0.516</b>	<b>6(6)</b>
PEOU1	0.621***			
PEOU2	0.594***			
PEOU3	0.715***			
PEOU4	0.741***			
PEOU5	0.780***			
PEOU6	0.829***			
<b>Perceived enjoyment</b>		<b>0.834</b>	<b>0.502</b>	<b>5(5)</b>
PE1	0.632***			
PE2	0.684***			
PE3	0.756***			
PE4	0.689***			
PE5	0.773***			
<b>Attitude</b>		<b>0.884</b>	<b>0.607</b>	<b>5(7)</b>
ATT3	0.685***			
ATT4	0.861***			
ATT5	0.754***			
ATT6	0.727***			
ATT7	0.852***			
<b>Behavioral intention to use</b>		<b>0.805</b>	<b>0.609</b>	<b>4(4)</b>
BITU1	0.693***			
BITU2	0.714***			
BITU3	0.718***			
BITU4	0.727***			

Notes. <sup>a</sup> Final items (initial items). ATT2 is excluded due to low weight (<0.5). \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ . Fit statistics after purification process: Chi-square= 311.819; Chi-square/df=1.223; CFI= 0.979; GFI= 0.901; TLI= 0.975; RMSEA= 0.032.

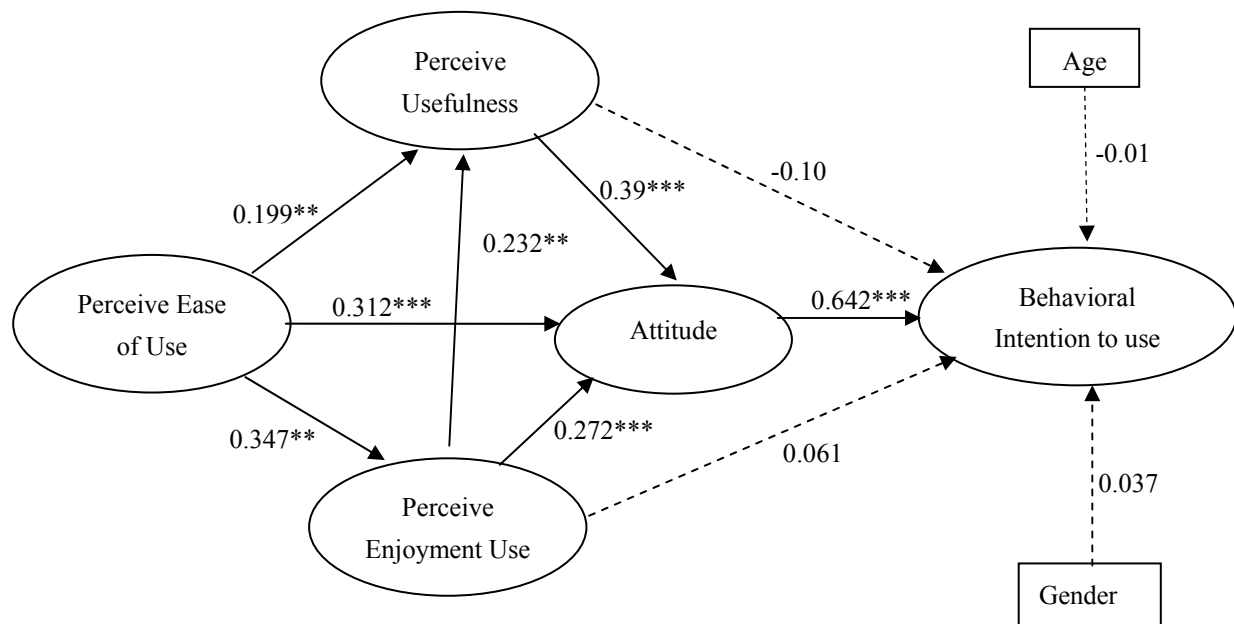


Figure 2. The results of testing research model

Note. \*\*\* $p < 0.001$ .

In the final stage, the examination of SEM was implemented to test the hypothesized causal relationships within the research model. The results of fit statistics in SEM include: chi-square= 318.109; Chi-square/df= 1.160 (<5); CFI= 0.982 (>0.9); GFI= 0.901(>0.9); TLI= 0.979(>0.9); RMSEA= 0.027 (<0.08).

Figure 2 presents the results of SEM with standardized regression weights. The results show that PEOU has a positive relationship with PE, attitude and PU (these relationships' estimated coefficients  $\beta = 0.347$ ,  $\beta = 0.312$  and  $\beta = 0.199$  with the significant level at 1%, respectively). PU and PE have positive impacts on attitude with  $\beta = 0.39$  and  $0.272$ , respectively. Finally, there is a strong correlation between attitude and BITU ( $\beta = 0.642$ ). However, there is no difference from age and gender in BITU 3G mobile services.

Table 5 presents the results of testing hypotheses. As above results, only hypotheses 5 and 7 are rejected while the remaining hypotheses are accepted.

Table 5. Result of testing hypotheses

Hypotheses	Result of testing
H1: PEOU positively affects PU of 3G mobile services.	Supported
H2: PEOU has a positive effect on attitude towards using 3G mobile services.	Supported
H3: PEOU has a positive impact on PE of 3G mobile services	Supported
H4: PU positively affects attitude towards using 3G mobile services.	Supported
H5: PU has a positive effect on BITU 3G mobile services.	Not supported
H6: PE positively affects attitude towards using 3G mobile services.	Supported
H7: PE has a positive impact on BITU 3G mobile services.	Not supported
H8: PE has a positive effect on PU of 3G mobile services.	Supported
H9: Attitude positively affects BITU 3G mobile services	Supported

## 5. Discussion

At the beginning, hypothesis that PU of 3G is positively affected by PEOU is supported. This finding is consistent with the result in previous empirical studies, especially original research developing TAM model of Davis (1989). In addition, according to Figure 2, standardized regression weight of the direction shows that the estimated coefficient effect of PEOU on PE (0.347) is higher than that of PEOU on PU (0.279) and ATT (0.312). This implies that the easier usage of new technology, the more customers enjoy 3G mobile services. Therefore, it comes to concluding that a customer, who feels easy to access, operate and use 3G services, is likely to use more 3G more services.



Like above relationship, positive relationships between PEOU and ATT, PU and ATT, PU and ATT, PU and BITU, ATT and BITU mentioned in H2, H3, H4, H5 and H8 are also supported by original TAM model of Davis (1989). In contrast, we find there is no direct effect of PU on BITU and not consistent with the finding in TAM of Davis (1989). However, some other studies (Liao et al., 2007; Kuo & Yen, 2009) figure out the same findings which also do not support this hypothesis. This may imply that Vietnamese customers have not utilized the great applications and services of 3G technology. Clearly, according to descriptive statistics from this study, some useful applications and services such as video call, online music, online television, and so on accounted for a small percentage of applications from 3G mobile services, which refers that these 3G applications may be still not popular for 3G users. The explanation for this could be that Vietnamese 3G customers just focus on using traditional or familiar applications like chatting services or web-surfing, which makes up majority of 3G application usage. In addition, subscribers often choose a minimum package of 3G mobile services to save monthly charges. Therefore, with such a limited package of data transmission per month, 3G customers are more likely to avoid using online services with requiring huge data transactions. Specifically, the PE is positively associated with PU; the result is also consistent with that of Liao et al. (2007). This confirmed PE is a potentially essential variable to use 3G services.

The results of testing two hypotheses H6 and H7 also demonstrate interesting findings. Specifically, H6 proposing that PE positively affects ATT was supported and this echoes the finding of prior studies (Moon & Kim, 2001; Van der Heijden, 2003; Bruner & Kumar, 2005; Liao et al., 2007). Therefore, it concludes that more fun and exciting characteristics of 3G-based services or greater variety of them, which can encourage customers' curiosity and interest will make customers more willing to use 3G.

On the other hand, as comparing with the research model of Liao et al. (2007), it could be seen that there is a direct relationship between PE and BITU, meanwhile the result from our research model is unsupported because its p-value equal higher than criteria of 0.05 for statistical significance. However, there are some previous studies supporting this finding (Chong et al., 2010; Suki, 2011). One explanation for this could be that there is a lack of 3G-based services that customers really perceive and feel fun or enjoyable. In addition, the reason for explaining H5 mentioned above could explain this finding somehow. This reason is that 3G customers do not use various 3G-based applications and services so completely that they can experience really perceived usefulness and fun. They just focus on familiar or mostly-used services to satisfy their basic needs like web-surfing or chatting services due to high monthly fees of a larger package of data transmission.

## **6. Conclusion and Implications**

### *6.1 Conclusion*

This study investigated acceptance of the 3G mobile services by identifying the key factors which significantly affect 3G acceptance process. The study concluded that perceived ease of use, perceived usefulness and perceived enjoyment are all essential factors to attitude towards using 3G services. The findings are consistent with many previous studies conducted in other countries. Specifically, perceived ease of use has positive effects on perceived usefulness and perceived enjoyment. Finally, attitude is always a significant factor having a very strong impact on customer's BITU in acceptance process and the control variables of the demographic profiles such as age and gender have no significant effect on behavioral intention to use 3G mobile services.

### *6.2 Managerial Implications*

In terms of practical aspects, this study also provides some implications. These implications can be applied by 3G providers in order to offer and improve more 3G services and value added contents for customers, especially young customers who are the main target in this study. The perceived usefulness and perceived ease of use still plays an important role in encouraging the positive attitude of customers towards using 3G. For this reason, providers of 3G services should focus on drawing much attention of customers to notice potential and new benefits as well as easiness of operating 3G-based services in marketing especially in some special presentation events such as technology fairs and technology exhibitions to give more opportunities for customers to experience 3G services directly. The ease of use is a vital dimension to the process of adoption. Existing and potential customers will always be willing to use a variety of 3G mobile services if they are easy to use and one important point is that when they access these services easily they soon discover the benefits and fun or enjoyment in application or services, which lead them to feel good attitude. Besides, providers of 3G should care about the fun and enjoyment of 3G services and application by designing and developing interesting and entertaining contents with appropriate subscribing and usage fees. According to the opinions during the survey from respondents, they also suggested that 3G providers could improve transmission speed and reduce the usage fees of 3G to make 3G services worthy and easy to use for customers. Finally, to improve consumers' behavioral

intention adopting 3G for mobile phone, attitude should be the main focus of providers of 3G. Providers themselves need to focus on listening and receiving customers' feedbacks via technical support centers or customer service centers to improve and offer more value added services for customers.

### 6.3 Limitations

The first limitation is that majority of the number of respondents are undergraduate students. It means that the results from the study could not be used in order to generalize all customers. For this reason, a future study could target diversity of subjects with different backgrounds or demographic characteristics, which makes results of research more convincing and easier to generalize and conclude.

Secondly, the proposed research model is still simple with original factors in TAM model and it does not cover many complex or potential factors, which can involve in the adoption process. Therefore, future research could add other factors, which have been so newly potential and have just been explored in very few recent relevant researches such as network effects, personal innovativeness, cost, service quality and trust. In addition, a further study should emphasize on the different characteristics between information technology and 3G so that they can apply the research model more practically.

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