

## Measurement for Analyzing Instant Messenger Application Adoption Using a Unified Theory of Acceptance and Use of Technology 2

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**Abstract:** The average of customers in using instant messenger applications such as WhatsApp, Blackberry Messenger (BBM), LINE, KakaoTalk and WeChat in Indonesia is 40 min per customer per day. This number is the lowest among other South East Asia countries. While, the number of application downloaded in Indonesia is the second highest among those six countries in South East Asia. The second highest number of downloaded application which is not in line with highest usage of application is not good for business. It is important to motivate customers to use the downloaded application in their activities. Analyzing factors that affect the behavior intention and usage behavior of customers toward instant messenger applications is needed. So far, there is no well published research regarding this matter yet. This research intends to propose a measurement model to analyze factors that affect the behavioral intention and usage behavior of customers toward instant messenger applications in Indonesia, based on Unified Theory of Acceptance and Use of Technology 2 from Venkatesh. The measurement model has been tested by using 30 respondents, the users of instant messenger applications. The pilot test reveals that the measurement model is valid and reliable to be used for further study.

**Key words:** Measurement, instant messenger application, adoption, UTAUT2, technology

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### INTRODUCTION

Now a days, using smartphone becomes a trend in Indonesia. Survey from Roy Morgan Research in March 2012-2013 found that smartphone ownership in Indonesia is 24% of total population. Smartphone usage in Indonesia is averagely 189 min or approximately 3 h 15 min. The activities which frequently do by smartphone users in Indonesia are chatting (2, 1 min), browsing (1, 9 min), multimedia (1, 1 min), game (1, 1 min), social network (1, 1 min) and Apps store (0, 2 min) (Inilah 10 Aktivitas 2013). Chatting has become the most frequently activities by smartphone users due to the increasing of new instant messenger applications available for smartphone. Some of those instant messengers are WhatsApp, Blackberry Messenger (BBM), LINE, KakaoTalk and WeChat. The usage of chatting has replaced the function of Short Messages Service (SMS) to some smart phone users. Total messages sent through instant messenger successfully get beyond total messages sent through SMS. Furthermore, report from flurry analytics shows that the users of this application increase dramatically in 2013 which reach 115% compared with previous years (Jagat Review.com, 2014).

The survey result of Mobile Marketing Association (MMA) and vserv.mobi to 3,000 mobile web and

application user in six South East Asia countries: Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam revealed that the frequency of mobile content downloaded in Indonesia, especially for application categories is the second highest among others. Indonesia is the only country which has the number of downloaded application consistently above average of South East Asia, the other countries intend to fluctuate. The second highest number of application downloaded is not in line with the usage. The usage of application in Indonesia is the lowest among other South East Asia countries. This condition is not good for business, since application developers and companies usually get benefit from usage fee of the applications. The more the application is used the benefit the application developers and companies be. It is important to motivate customers to use the downloaded application in their activities.

Analyzing factors that affect the behavior intention and usage behavior of customers toward instant messenger applications is needed in order to motivate them to use the application. So far, there is no well published research regarding this matter yet. This research has an objective to propose a measurement model to analyze factors that affect the behavioral intention and usage behavior of customers toward instant messenger applications in Indonesia.

There are several theories and models that can be used in predicting behavioral intention and use behavior of customer toward services based on technology such as instant messenger applications. Starting from Theory of Reasoned Action first introduced by Fishbein and Ajzen (1967) until Unified Theory of Acceptance and Use of Technology (UTAUT) 2 founded by Venkatesh *et al.* (2003). This study uses UTAUTM2 Model from Venkatesh *et al.* (2003). Thus, this study wants to propose the measurement model to test the adoption factors of instant messenger application in Indonesia by using UTAUT2.

### **Unified Theory of Acceptance and Use of Technology (UTAUT) 2:**

In order to achieve the objective as described in the introduction, the literature review of theories and models related to user adoption of technology-based service are actually needed. There are nine models and theories which usually used to analyze consumer adoption of technology based service (Indrawati, 2012). Those models and theories are:

- Theory of Reasoned Action (TRA)
- Theory of Planned Behaviour (TPB)
- Technology Acceptance Model (TAM)
- Motivational Model (MM)
- Combined TAM-TPB (C-TAM-TPB)
- Model of Personal Computer Utilization (MPCU)
- Innovation Diffusion Theory (IDT)
- Social Cognitive Theory (SCT)
- Unified Theory of Acceptance and Use of Technology (UTAUT)

From those nine models, UTAUT Model is the model which can present the highest prediction value in some researches (Indrawati, 2012; Venkatesh *et al.*, 2003). UTAUT Model is developed by Venkatesh, Morris, Davis and Davis who combined eight technology acceptance theories such as TRA, TPB, TAM, MM, C-TAM-and-TPB, MPCU, IDT and SCT.

Through, a set of longitudinal studies in four different organizations, UTAUT was formulated. UTAUT Model showed that behavioral intention directly affected by performance expectancy, effort expectancy and social influence variables while use behavior is affected by facilitating conditions and behavioral intention. This model also involves four moderating variables, namely: gender, age, experience and voluntariness of use (Indrawati, 2012; Venkatesh *et al.*, 2003).

UTAUT Model is the most suitable model to explain behavior to use technology. UTAUT can predict consumer intention to adopt technology-based service until 70% while other eight models can only predict between 17-53% (Indrawati, 2012). This model then developed by Venkatesh *et al.* (2003). According to Venkatesh *et al.* (2003), UTAUT has extracted the critical factors and contingencies related to the prediction of behavioral intention to use a technology in organizational context. Development of UTAUT Model to UTAUT2 is to study and understand acceptance and use of technology in consumer context. There are three types of UTAUT extensions. The first type of extension tested UTAUT in new contexts, new user populations and new cultural settings. The second type is the addition of new constructs in order to expand the scope of the endogenous theoretical instruments outlined in UTAUT and the third type is the inclusion of exogenous predictors of the UTAUT variables. Venkatesh *et al.* (2003) add three new constructs to UTAUT Model, namely: hedonic motivation, price value and habit and involves three moderating variable namely: age, gender and experience.

**Performance expectancy:** According to Venkatesh *et al.* (2003), performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain in job performance. This study defines performance expectancy as the degree to which a person believes that using instant messenger applications would enhance his or her need to access real time to information and communications to be easily reached at any time and place. Performance expectancy is the strongest predictor of behavioral intention (Venkatesh *et al.*, 2003). This result also found in a research done by Pahnla that performance expectancy, a combination of usefulness, compatibility and relative advantage variables from TAM and IDT is the most significant factor influences behavioral intention. Performance expectancy was found to positively influence the behavioral intention of customers to use a 3G mobile service in Taiwan and in Indonesia (Indrawati, 2012). The influence of performance expectancy to behavioral intention varied on gender and age where the result showed more significant effect on younger men (Venkatesh *et al.*, 2003).

**Effort expectancy:** According to Venkatesh *et al.* (2003), effort expectancy is defined as “the degree of ease associated with the use of the system”. This study defines effort expectancy as the degree of ease associated with the use of the instant messenger applications. The

research results from Venkatesh *et al.* (2003) reveals that effort expectancy has positive effect to behavioral intention. The effect of effort expectancy to behavioral intention is moderated by gender and age which more significant on older women and this effect decrease with increasing of experience. Effort expectancy positively influences finnish consumers' behavioural intention to use mobile services and Indonesian consumers' behavioral intention to use 3G mobile multimedia services (Indrawati, 2012).

**Social influence:** Based on Venkatesh *et al.* (2003), social influence is defined as “the degree to which an individual perceives that important others believe he or she should use the new system”. This study defines social influence as the extent to which members of social networks such as friends and family, influence one another's behavior while using instant messenger applications. Social influence has affected the behavioral intention with the most significant effect on older women and using technology as mandatory with a little experience. The social influence variable positively influences the behavioural intention of Taiwanese respondents to use the services of 3G mobiles and Indonesian respondents to have intention to use 3G mobile multimedia services (Indrawati, 2012).

**Facilitating conditions:** According to Venkatesh *et al.* (2003), facilitating conditions variable is defined as “the degree to which an individual believes that an organizational and technical infrastructure exists to support use of system”. This study defines facilitating conditions variable as the degree to which an individual believes that factors such as availability of devices, knowledge, guidelines and staff or people from social group exist to support the use of instant messenger applications. In UTAUT2 Model, Venkatesh *et al.* (2003) adds direct effect of facilitating conditions to behavioral intention. Based on Venkatesh *et al.* (2003) research related to UTAUT2 Model, facilitating conditions have an effect to behavioral intention which is moderated by gender and age. Wu and Indrawati (2012) indicate that facilitating conditions positively affect behavioural intention.

**Hedonic motivation:** Based on Brown and Venkatesh, hedonic motivation is defined as “the fun or pleasure derived from using a technology”. This study defines hedonic motivation as the degree of fun or pleasure derived from using instant messenger applications. Brown and Venkatesh revealed that hedonic motivation has played an important role in determining technology

acceptance and use. Furthermore, Venkatesh *et al.* (2003) stated that hedonic motivation is a critical determinant factor of behavioral intention in non-organizational context.

**Price value:** Venkatesh *et al.* (2003) stated that one of the important differences between use of technology in consumer and organizational context is the existent of monetary cost. In consumer context, the users usually have to scarify money, thus there is monetary cost but in organizational context, the users are employees who do not need to scarify money. Cost or price structure may have significant effect to use of technology by consumers, just like in this study. Price is an important factor because consumers must spent money to purchase device and service. Price value is positive when the benefits of using a technology are perceived to be greater than the monetary cost scarified by customers, thus such price value has a positive impact on intention (Venkatesh *et al.*, 2003). Thus, this study defines price value as benefit perceived by user on monetary cost spent to use instant messenger application.

**Habit:** Limayem defined habitas “the extent to which people tend to perform behaviors (used information system) automatically because of learning”. This study defines habit as the extent to which people tend to use instant messenger application automatically because of learning. There are three primary antecedents to habit development considered to be valid across the board, namely: frequent repetition of the behavior in question, the extent of satisfaction with the outcomes of the behavior and relatively stable contexts (Venkatesh *et al.*, 2003).

**Behavioral intention:** Regarding behavioral intention construct, Ajzen (1991) assumed that intention was one of motivational factors that influence a behavior. More over Ajzen stated that intention are indications of how hard people are willing to try of how much of an effort they are planning to exert in order to perform the behavior. This study defines behavioral intention as the degree to which a person will use instant messenger application in the future.

**Use behavior:** According to Wu, use behavior is measured by counting the frequency of actual use of technology by user. Venkatesh *et al.* (2003) stated that use behavior measured by frequency of using mobile internet. This study defines use behavior as the frequency of the users in using instant messenger application.

Table 1: Operationalization variable

| Variables               | Definition  | Indicator  | No. of item | References  |
|-------------------------|---|--|-------------|---|
| Performance expectancy  | The degree to which a person believes that using instant messenger applications would enhance his or her need to access real time to information and communications to be easily reached at any time and place  | Using instant messenger application to help in communication<br>Using instant messenger to help in obtain information  | 1-4         | Venkatesh <i>et al.</i> (2003) and Indrawati (2012) |
| Effort expectancy       | The degree of ease associated with the use of the instant messenger applications  | Effort needed to learn about how to use instant messenger applications<br>Effort needed to use instant messenger   | 5-8         | Venkatesh <i>et al.</i> (2003) and Indrawati (2012) |
| Social influence        | The extent to which members of social networks such as friends and family, influence one another's behavior while using instant messenger applications  | Opinion of closest friends or family about the needs to use instant messenger application<br>Recommendation from closest friends or family to use instant messenger applications | 9-12        | Venkatesh <i>et al.</i> (2003) and Indrawati (2012) |
| Facilitating conditions | The degree to which an individual believes that factors such as availability of devices, knowledge, guidelines and staff or people from social group exist to support the use of instant messenger applications | Internal facilitating conditions to use instant messenger applications<br>External facilitating condition to use instant messenger applications                                  | 13-17       | Venkatesh <i>et al.</i> (2003) and Indrawati (2012) |
| Hedonic motivation      | The degree of fun or pleasure derived from using instant messenger applications   | Using instant messenger application is perceived being fun<br>Enjoyment by using instant messenger application   | 18-20       | Venkatesh <i>et al.</i> (2003)                      |
| Price value             | The degree of benefit perceived by user on monetary cost spent to use instant messenger application   | Monetary cost spent by user to use instant messenger application is affordable<br>Value obtained from use of instant messenger application                                       | 21-24       | Venkatesh <i>et al.</i> (2003)                      |
| Habit                   | The extent to which people tend to use instant messenger application automatically because of learning  | Using instant messenger application is automatically to do<br>Using instant messenger application is perceived as a necessity  | 25-29       | Venkatesh <i>et al.</i> (2003)                      |
| Behavioral intention    | The degree to which a person will use instant messenger application in the future   | Intention to choose instant messenger application than text messages<br>Intention to use instant messenger application in the future   | 30-33       | Venkatesh <i>et al.</i> (2003)                      |
| Use behavior            | The frequency of the users in using instant messenger application   | Intensity to use instant messenger application   | 34-37       | Venkatesh <i>et al.</i> (2003)                      |

Related to the object of this study which is in consumer context, the fittest model to be used is UTAUT2 Model of Venkatesh *et al.* (2003). Since, this study will only collect data one time, not a longitudinal study, the study only involves gender and age as moderating variable. Thus, experience is not involved in the model. Previous researches by Alkhunaizan and Love about mobile commerce acceptance and research by Lewis about acceptance technology for learning process in the class also use age and gender as moderating variables. These moderating variables can increase R<sup>2</sup> value of behavioral intention and use behavior.

**Measurements model:** The best fit model in a study must be supported with a good measurement model which fulfills the reliability and validity requirements. One of measurement model is a questionnaire in developing questionnaire there are four steps that should be followed in order to have good content validity, face validity,

construct and convergent validity (Indrawati, 2012). First, careful selection of existing items as also suggested by Churchill and Iacobucci (2005), Chew (2007) and Sekaran and Bougie (2010). In order to have the valid and reliable items it is better to carefully select items from previous related research. Arrange the items in operationalization variables table which consists of variables, definition of variables, items and references as can be seen at Table 1. Second, ask for experts' comments and suggestions in order to have good content validity as also suggested by Fink, Mitchell both cited in Hamidfar (2008). Having good comments and suggestions from experts, the items are arranged in the form of questionnaire and ready for the third step, readability test. Give the questionnaire to a people in each level of education in the population of the study in order to test the readability of the questionnaire. Once the questionnaire is considered to be readable, the next step is pilot test to prove if the questionnaire fulfills the construct validity (Indrawati, 2012).

**MATERIALS AND METHODS**

The proposed model of this study has eight exogenous variables, two endogenous variables and two moderating variables. The exogenous variables used in this research are Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Hedonic Motivation (HM), Price Value (PV), Habit (H) and Behavioral Intention (BI). Endogenous variable is dependent variable which is affected by independent (exogenous) variable. The endogenous variables used in this research are Behavioral Intention (BI) and Use Behavior (UB). Moderating variable is the third variable which changes the nature of relationship between independent and dependent variable. Moderating variables used in this research are age and gender. Operationalization variable in this research is shown in Table 1.

**Content validity and readability:** Content validity can be achieved through careful item selection, a studious review of previously tested measures as well as through incorporation of suggestions from literature (Chew, 2007; Hair *et al.*, 2010; Indrawati, 2012). All of these suggested methods for achieving good content validity of a construct were used in preparing the operationalization for each construct in the present study. The questionnaire was also assessed by three experts based in Indonesia. This process is in line with that did by Indrawati (2012).

The aim of this process was to validate the content of the questionnaire in terms of relevance, representativeness, suitability, accuracy and wording. Having this validation, the questionnaires are given to a people in each group of education in this study and the results show that the questionnaire is easy to read.

**RESULTS AND DISCUSSION**

A pilot study of the questionnaire was conducted to obtain a good instrument that fulfills the reliability and validity requirements, especially those of construct validity. The present study released the questionnaire to 30 respondents who possessed characteristics similar to those of the target respondents. The target respondents of the present study speak the Indonesian language; thus, the English questionnaire was translated into Bahasa Indonesia. The questionnaires were directly given to respondents by the researchers. All the completed questionnaires were collected and then scrutinized resulted that the entire collected questionnaire are valid for inclusion in the pilot study. The validity and reliability of the questionnaires were analyzed using the SPSS software. The results of the pilot study are presented in following.

Table 2: The CITC and CA values of performance expectancy

| Item codes | CITC  | CA    |
|------------|-------|-------|
| PE1        | 0.871 | 0.931 |
| PE2        | 0.801 | -     |
| PE3        | 0.880 | -     |
| PE4        | 0.820 | -     |

Table 3: The CITC and CA values of effort expectancy

| Item codes | CITC  | CA    |
|------------|-------|-------|
| EE1        | 0.868 | 0.938 |
| EE2        | 0.825 | -     |
| EE3        | 0.871 | -     |
| EE4        | 0.857 | -     |

Table 4: The CITC and CA values of social influence

| Item codes | CITC  | CA    |
|------------|-------|-------|
| SI1        | 0.872 | 0.951 |
| SI2        | 0.878 | -     |
| SI3        | 0.908 | -     |
| SI4        | 0.892 | -     |

**Performance expectancy; results of pilot study:** Table 2 presents the pilot study results for the Corrected Item-Total Correlation (CITC) and Cronbach’s Alpha (CA) values for all four items of the Performance Expectancy (PE) construct.

The 0.931 CA value indicates that the PE construct has good reliability. Each item of PE construct has value of CICT above 0.361 which indicates that the items have good validity.

**Effort expectancy; results of pilot study:** The pilot study results of Effort Expectancy (EE) construct shown in Table 3.

The 0.938 CA value indicate that the EE construct has good reliability. All of the EE items has CICT value above 0.361 which indicates that the items have good validity.

**Social influence; results of pilot study:** The pilot study results of Social Influence (SI) construct shown in Table 4

The 0.951 CA value indicate that the SI construct has good reliability. Each item of SI construct has CICT value above 0.361 which indicates that the items have good validity.

**Facilitating conditions; results of pilot study:** Table 5 presents the result of pilot study for Facilitating Conditions (FC) construct. From Table 5, it can be concluded that all of items for FC are above 0.361 which indicate good validity and the CA value above 0.70 which means it has good reliability.

**Hedonic motivation; results of pilot study:** The pilot study results of Hedonic Motivation (HM) construct shown in Table 6. The 0.900 CA value indicates that the HM construct has good reliability. All of the HM items has CICT value above 0.361 which indicates that the items have good validity.

Table 5: The CITC and CA values of facilitating conditions

| Item codes | CITC  | CA    |
|------------|-------|-------|
| FC1        | 0.853 | 0.948 |
| FC2        | 0.908 | -     |
| FC3        | 0.886 | -     |
| FC4        | 0.799 | -     |
| FC5        | 0.853 | -     |

Table 6: The CITC and CA values of hedonic motivation

| Item codes | CITC  | CA    |
|------------|-------|-------|
| HM1        | 0.875 | 0.900 |
| HM2        | 0.736 | -     |
| HM3        | 0.802 | -     |

Table 7: The CITC and CA values of price value

| Item codes | CITC  | CA    |
|------------|-------|-------|
| PV1        | 0.687 | 0.906 |
| PV2        | 0.825 | -     |
| PV3        | 0.854 | -     |
| PV4        | 0.804 | -     |

Table 8: The CITC and CA values of habit

| Item codes | CITC  | CA    |
|------------|-------|-------|
| H1         | 0.834 | 0.950 |
| H2         | 0.855 | -     |
| H3         | 0.926 | -     |
| H4         | 0.948 | -     |
| H5         | 0.784 | -     |

Table 9: The CITC and CA values of behavioral intention

| Item codes | CITC  | CA    |
|------------|-------|-------|
| BI1        | 0.757 | 0.871 |
| BI2        | 0.775 | -     |
| BI3        | 0.573 | -     |
| BI4        | 0.814 | -     |

**Price value; results of pilot study:** The pilot study results of Price Value (PV) construct shown in Table 7. The 0.906 CA value indicates that the PV construct has good reliability. Each item of PV construct has CICT value above 0.361 which indicates that the items have good validity.

**Habit; results of pilot study:** Table 8 present the CITC and CA value of Habit (H) construct. The 0.950 CA value indicates that the H construct has good reliability. All of the H items has CICT value above 0.361 which indicates that the items have good validity.

**Behavioral intention; results of pilot study:** The pilot study results of Behavioral Intention (BI) construct shown in Table 9.

From Table 9, it can be concluded that all items of BI has good validity because the CITC value is above 0.361. The 0.871 CA value of BI construct indicates that this construct has good reliability.

**Use behavior; results of pilot study:** The pilot study results of Use Behavior (UB) construct shown in Table 10.

Table 10: The CITC and CA values of use behavior

| Item codes | CITC  | CA    |
|------------|-------|-------|
| UB1        | 0.860 | 0.864 |
| UB2        | 0.692 | -     |
| UB3        | 0.573 | -     |
| UB4        | 0.758 | -     |

The 0.864 CA value indicate that the UB construct has good reliability. All of the UB items has CICT value above 0.361 which indicates that the items have good validity.

## CONCLUSION

The measurement model proposed in this study has been tested by using 30 respondents who live in Indonesia. They are the users of instant messenger applications BBM, WhatsApp and Line. The pilot test reveals that the measurement model which consists of 9 constructs and 37 items proposed in this study is valid and reliable. Therefore, this proposed measurements model is ready to be used in further study.

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