

Analysis of Privacy Concern on Adoption of Location Based Services Technology for Blood Donor Search

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Abstract— In the era of mobile technology, it is very common to find community-based applications that use Location Based Services technology to share location information. On the other hand, geographic location, for some people are confidential related to privacy. Based on the paradox then it is necessary to do research, whether a privacy concern can affect the adoption of a technology. This research takes study case of adoption of Location Based Services technology to help finding potential blood donor. For information, in Indonesia, the availability of blood stock in Blood Bank can not fulfill the blood demands, the gap is more than 50%. In the process, patients who do not get blood donors from a blood bank, will look for donors outside the blood bank. They usually send broadcast message via SMS or social media application. Related to this situation, we proposed an alternative way to search for potential blood donors by adopting Location Based Services technology. This paper will examine the adoption of Location Based Services technology to search potential blood donor, by considering the privacy parameter using the Unified Theory of Acceptance and Use of Technology (UTAUT) approach.

Keywords— LBS, UTAUT, blood search, privacy formatting

I. INTRODUCTION

Humans are creatures with many limitations, sometimes we have to deal with pain, even most of us have met the operating room at the hospital, and in certain situations, we need a blood donor. Based on the Kompasiana [1] in Indonesia, there is a shortage of blood stock nationwide by 50% these components, incorporating the applicable criteria that follow.

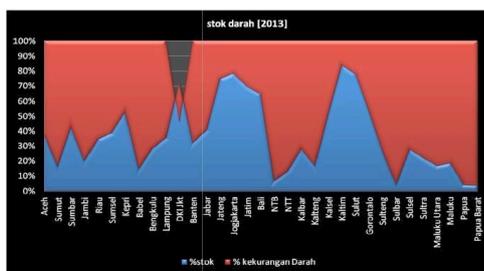


Fig. 1. Gap between blood supply and demand on the blood bank

This means that for every blood donor needed, the possibility to miss out is 50%, consequently they have to find blood donors by themselves. With such conditions, it will be adopted Location Based Service technology to help search for blood donors. This paper will discuss the level of user acceptance on LBS technology adoption due to privacy issues related to sharing location information on LBS technology. This research will be conducted using UTAUT model

II. LITERATURE REVIEW

A. UTAUT

The UTAUT model developed by Venkatesh, Morris, Davis, and Davis is a combination of eight technological acceptance theories, such as TRA, TPB, TAM, MM, CTAM-and-TPB, MPCU, IDT, and SCT. Through longitudinal research methods in four different organizations, Venkatesh et al. (2003) formulated a new model that could explain the acceptance and use of technology with the highest R2 compared with the previous model or 0.70 (Indrawati, 2015; Venkatesh et al., 2003; Wu et al., 2008).

UTAUT combines successful concepts in the previous eight models of TRA, TAM, TPB, motivation models, Personal Computer (PC) utilization models, Innovation diffusion theory, and SCT. Venkatesh et al (2003) found 4 main variables as direct determinant of Behavioral Intention and Use Behavior that is Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Condition. In addition there are four factors that moderate the four variables Behavioral Intention and Use Behavior that is Age, Gender, Experience and Voluntaries of use.

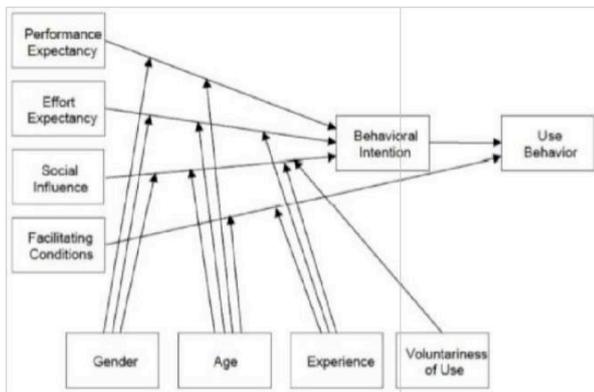


Fig. 2. UTAUT constructs model

b. UTAUT2

The UTAUT2 model is a further development of the UTAUT model, where UTAUT2 studies the acceptance and use of a technology in the consumer context (Venkatesh et al., 2012). The purpose of the UTAUT2 model is to identify three important constructs of acceptance research and the use of technology for both the public and the consumer, altering some of the relationships already present in the UTAUT model concept, and introducing new relationships (Venkatesh et al., 2012). Three added constructs are hedonic motivation, price value, and habits.

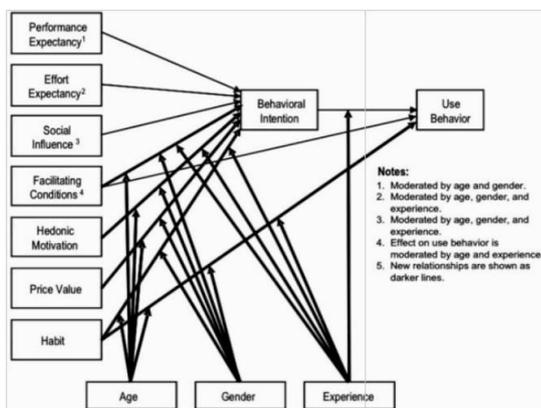


Fig. 3. UTAUT2 constructs model

Hedonic Motivation is the level of relief and happiness of using the system. Price Value measure how much an individual is willing to pay the costs associated with using the system. Habit is the level of desire to use the system based on the results of previous experience.

c. Privacy Concern

Privacy concern reflects user concern on personal information disclosure [7].

d. LBS

Location Based Services technology provides information about the geographic location of mobile telecommunication devices, such as mobile phones, mobile interactive browsers and devices attached to other moving objects such as people, packages and vehicles[8]. The LBS development framework

can be illustrated as follows

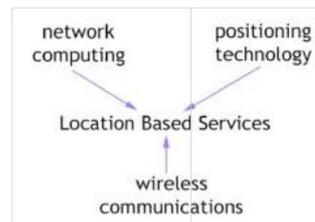


Fig. 4. LBS development framework

The integration of network computing, positioning technology and wireless communication are the three main factors in LBS technology development.

Network Computing.

Network computing is a system that refers to the use of computers and other devices in a connected network, not as a stand-alone device. These devices are integrated into an environment that facilitates user activity by maximizing the data network and minimizing direct interaction [9].

Positioning Technology

Positioning technology, including satellite-based systems such as GPS, ground-based systems such as RFID and cellular triangulation, allows to monitor the position of several types of objects in real time [5].

Wireless Communication

Wireless data communications is a combination of mobile communications and data communications by giving consumers easy access via wireless devices (mobile phones, personal digital assistants, computers, etc.) for relevant information both on the internet and intranets

Spatial Data Infrastructure

Quoted from www.esri.com [4], the term spatial data infrastructure was created in 1993 by the US National Research Council to demonstrate a framework of institutional technologies, policies and arrangements that together facilitate the creation, exchange and use of geospatial data And information sources, including information sharing to the public

III. RESEARCH MODEL

This research refers to model UTAUT2, the following are the variables included:

1. Performance Expectancy (PE) is the level of technology will provide benefits in doing certain activities.
2. Social Influence (SI) is the rate at which user interaction factors can influence each other to use technology

3. Facilitating Conditions (FC) is the user's perception of the availability of resources and the drive to use
4. Hedonic Motivation (HM) is the level of happiness of using the system
5. Price Value (PV) measures how much an individual is willing to pay the costs associated with using
6. Habit (H) is the level of desire to use the system based on the results of previous experience
7. Behavioral Intention (BI) is the level users will intend to use the system

6. H6: Facilitating Condition positively and significantly influence the behavioral intension
7. H7: Habit positively affects behavioral intension
8. H8: Privacy concern has an effect on behavioral intension

As for "the Use Behavior parameter" (UB) is not one of the parameters studied because the application is still a prototype so that the user behavior can not be measured. In this study, the "Privacy Concern" variable will be added to test whether the privacy issue becomes significant in the implementation of technology adoption. So the model that will be used in this research is as follows:

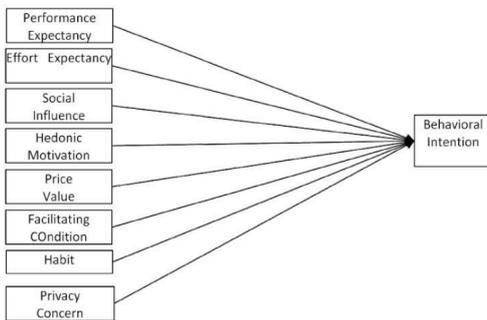


Fig. 5. Research Model

Hypothesis

The hypothesis in this study is based on the model of UTAUT2 [7] and will be verified in the processing process in the next discussion. Hypothesis in this research is as follows:

1. H1: Performance Expectancy positively and significantly influence to behavioral intension
2. H2: Effort Expectancy positively and significantly influence the behavioral intension
3. H3: Social Influence positively and significantly influence to behavioral intension
4. H4: Hedonic Motivation positively and significantly influence the behavioral intension
5. H5: Price Value positively and significantly

IV. METHOD

The research includes nine variable. Each variable was measured with multiple items. All items were adapted from extant literature to improve content validity [10]. This study was conducted by two-step approach, we first examined the measurement model to test reliability and validity. Then we examined the structural model to test research hypotheses and model fitness [11].

V. RESULT

THE MEASUREMENT MODEL (OUTER MODEL)

This research testing is conducted by testing Convergent Validity, Discriminant Validity and unidimensionality against the indicators used in the study. With the following results

Table 1. Construct Reliability and Validity

Variabel	Average Variance	Rule of Tumb	Kesimpulan
	Extracted (AVE)		
BEHAVIORAL INTENTION	0.9219	AVE > 0.5	Valid
EFFORT EXPECTANCY	0.6977	AVE > 0.6	Valid
FACILITATING CONDITION	0.9573	AVE > 0.7	Valid
HABIT	0.9635	AVE > 0.8	Valid
HEDONIC MOTIVATION	0.8899	AVE > 0.9	Valid
PERFORMANCE EXPECETANCY	0.7694	AVE > 0.10	Valid
PRICE VALUE	0.8036	AVE > 0.11	Valid
PRIVACY CONCERN	0.6394	AVE > 0.12	Valid
SOCIAL INFLUENCE	0.7455	AVE > 0.13	Valid

Table 2. Loading factor

Variable	Indicator	Indikator	Rule of Thumb	Result
		Loading		
BEHAVIORAL	BI1	0.974	0.7	Valid
INTENTION	BI2	0.974	0.7	Valid
	BI3	0.930	0.7	Valid
	EE1	0.879	0.7	Valid
EFFORT	EE2	0.870	0.7	Valid
	EE3	0.825	0.7	Valid
	EE4	0.759	0.7	Valid
	FC1	0.986	0.7	Valid
HABIT	FC4	0.9559	0.7	Valid
	HB1	0.9807	0.7	Valid
HEDONIC	HB2	0.9824	0.7	Valid
	HM1	0.9038	0.7	Valid
MOTIVATION	HM2	0.9669	0.7	Valid
	HM3	0.9581	0.7	Valid
	PC1	0.7462	0.7	Valid
PRIVACY CONCERN	PC2	0.7564	0.7	Valid
	PC3	0.8884	0.7	Valid
PERFORMANCE	NPE1	0.8262	0.7	Valid
EXPECETA	PE2	0.9463	0.7	Valid
	PE3	0.9283	0.7	Valid
	PE4	0.7988	0.7	Valid
	PV1	0.8116	0.7	Valid
PRICE VALUE	PV2	0.9165	0.7	Valid
	PV3	0.9551	0.7	Valid
	S11	0.8668	0.7	Valid
SOCIAL INFLUENCE	S12	0.8789	0.7	Valid

From Convergent Validity, Discriminant Validity and unidimensionality it shows that all the indicators are valid and reliable.

Inner Model (Model Struktur)

Inner model analysis (structural analysis) is conducted to ensure that structural models are built robust and accurate based on the theory and formulation of research hypotheses. This analysis is conducted to see the relationship between exogenous latent variables and endogenous variables. This analysis conducted by calculating R-Square and T-Value to determine the significance level.

- R-Square

Structural model testing will see the R-Square value of the endogenous variable as the predicted power value of the structural model. The R-Square value describes the effect of the independent variables on the dependent variable being measured. The higher the R-square value means the predicted value of a model is getting stronger. In this study Rsquare value obtained from the data processing with SmartPLS

Table 3. R-square result

	R Square
BEHAVIORAL INTENTION	0.91

The value shows the predicted percentage of behavior intention influenced by the variable performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, habit and privacy concern.

Table 4. Rule of thumb for R-Square

Kriteria	Rule of Thumb
R-Square	> 0,67 kuat
	> 0,33 moderat
	> 0,19 lemah

Based on the above categories, the R-square results show that the model used in this study is in the strong category. T-test Value.

To test the significance of each independent variable to the dependent variable it is done by comparing the T Value coefficients of each independent variable to the significance value of the T-table level.

Table 5. Rule of thumb for T-Value

Kriteria	Rule of Thumb
Signifikasi t-value	One tailed :
	Significance level 5% : 1,65
	Significance level 10% : 1,28
	Significance level 25% : 0,68

Data processing is done by bootstrapping SmartPLS with one-tailed test using 10% significance level (t-statistic = 1.28). A hypothesis will be accepted if the value of T-Value is greater than the significance value (T-Table).

Privacy concern, the results of the above analysis confirming the result of Haejung Yun (2013) that a smartphone and mobile internet service, LBS application could eventually become 'killer application'. However, the 'when and wherever' and 'always-on' LBS properties can pose a threat to the user's location privacy. The results of this study have practical implications for interested parties, including application developers and LBS service providers to better provide security related privacy concerns.

Hedonic motivation and social influences are the second and most factors that affect behavioral intentions on system usage. This confirms the research of "Mental Healthcare Social System" Marlene Lynette (2014) one can improve their personal lives by using health applications such as sports applications, fitness, relaxation applications, fire prevention applications. In addition to improving personal health, they are mutually respectful of others for using the app and together, contributing.

The Habit variable and price value have the lowest path value in affecting behavioral intention using a location based blood search system. This study uses prototype applications and has not been installed in mass so that the base community is still small, this affects the tendency to familiarize using a location-based search system. While the variable price value, respondents expect a fee that can be cheaper than the search using chain messages, so the concept of paid on this system is less attractive according to the respondents.

In this study, performance expectancy, Effort expectancy and facilitating conditions are not proven to significantly influence the behavioral intention to use location-based donor search systems. This is probably because this research uses prototype application and has not been installed in bulk so the community base is still small in number, so that the respondent has not been able to feel the benefit of location based donor search system maximally. In

the other hand, the social influence variable confirm that the benefits of the system will be more can be felt when the application is already widely installed and together contributes to each other.

VI. CONCLUSION

Consecutively, the privacy concern, hedonic motivation, social influence, habits and price value provide the most significant influence on behavioral intent. This notify that using a location-based blood donor search system, privacy issues is a key factor for users. Even though, compared to the benefit of the system, user still want to use the location based search.

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