# USER ACCEPTANCE MODELING TOWARD E-HEALTH-BASED SOCIAL NETWORK SITES: CASE STUDY UTILIZATION OF FACEBOOK AS A MEDIA TO SHARE KNOWLEDGE ABOUT HEALTH

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**ABSTRACT:** The presence of Social Network Sites (SNS) has opened the chance to utilize SNS (e.g. Facebook) as a manifestation of e-health. There are millions of Groups in Facebook created by the members, for example  the *"Aku Ingin Hamil - AIH"* from Indonesia. The great potential for knowledge sharing activities in the AIH Group suggests an important question to be examined : what kinds of reasoning or motivation leads people to use e-health-based-social networking as a medium to share knowledge? This research proposed a modified Technology Acceptance Model (TAM) in order to explain willingness to use e-health.  Using  an online questionnaire, 215 respondents were obtained randomly.  Model testing was conducted using Structural Equation Modeling (SEM) indicating that our modified TAM model complies with the goodness of fit model prerequisite. This research result is that the usage of an e-health-based social network was much influenced by the existence of shared goals, interpersonal trust, and social ties.

**Keywords:** E-health, Technology Acceptance Model (TAM), Social factors

## INTRODUCTION

In this era of globalization, there is an opportunity to implement health development programs by applying Information and Communication Technology (ICT). ICT applications to support health development programs are more popularly called e-health. Generally, e-health can be defined as a new field intersecting among ICT, medicine and public health, and efforts correlating with the optimization of healthcare service through internet channels [1 - 3].   The World Health Organization (WHO) defines e-health broadly as the use of ICT in the health sector. It refers to the health care components delivered, enabled, or supported through the use of ICT [4]. It may provide clinical communications between healthcare providers and access to information databases, knowledge resources, and decision support tools to guide health care service delivery.

The development of ICT, commonly characterized by the presence of Social Network Sites (SNS), opens the chance to utilize SNS as an e-health application. SNS is a social structure in the virtual world made by collections of individual knots or specific ties (values, ideas, friendships), enabling individuals to shape public profiles in their own system, express other members connected to them, communicate and collaborate with others, and form relationships among millions of other members worldwide [5, 6]. Based on its characteristics, SNS can function as the medium to accomodate knowledge sharing about health. Facebook is the most popular SNS in the world, including Indonesia. There are millions of groups in Facebook formed by members around the world, and one example is the *"Aku Ingin Hamil - AIH"* Group, made up of Indonesian members only. In English, AIH translates as "I want to get pregnant". The AIH Group consists of women who have long missed children in their households. The majority of them are educated women with such

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main categories as graduated with bachelor degrees, aged between 20 to 40 years old, already married at least 2 years, and having good careers in their offices. The AIH Group has the specific goal of kowledge sharing among 5.955 group members, namely pre-conception and pregnancy. Knowledge sharing activities happen actively every day, marked by more than 35 new topic discussions and more than 50 comments on each new topic.

Based on great potential for knowledge sharing activities happening inside the AIH Group, we focus on the following question : "what kinds of motivation leads people to use e-health-based social networking as a medium to share knowledge about health?" One of the key factors stimulating that is user acceptance of relevant technologies [7 - 9]. User acceptance means active usage of ICT in order to support job completion. User acceptance is often explained by the Technology Acceptance Model (TAM). Therefore, this research used the TAM as the main model to explain user acceptance toward e-health-based-social networks. Proposed by Davis, Bagozzi, and Warshaw, TAM was derived from the Theory of Reason Action (TRA) and has two main constructs, namely Perceived Usefulness (PU) and Perceived Ease Of Use (PEOU) [10]. In order to generate a better model explaining user acceptance, this research proposes a modified TAM by adding external variables to the original TAM. External variables are appropriate antecedent factors for PU and/ or PEOU which can improve TAM 's capability to explain user acceptance [10]. The present research context is usage of facebook to facilitate knowledge sharing activity about health among users. Thus external variables should interpret interpersonal relationships among users which stimulate willingness to share knowledge through facebook (e-health). The proposed external variables are Shared Goal (SG), Interpersonal Trust (IT), and social Ties (ST). The model proposed by this research can be beneficial for guiding interventions of e-health usage in other areas, such as health promotion and education.

**METHODOLOGY**

This research used a cross sectional survey held during November through December 2012. Research data were collected using an online questionnaire prefaced by participation requests posted in the AIH Group's wall, containng information about the research, the questionnaire web address, and tags for candidate respondents. Besides being posted on the group's wall, participation requests also were sent using personal

messages in facebook to candidate respondents. Names of candidate respondents were obtained randomly ( as many as 1,000 persons) from the AIH member list containing 5.955 different names. Data collection was stopped after no more respondents filled out the questionnaire.

The online questionaire consists of a variety of questions which were grouped into seven constructs, namely Shared Goal (SG), Interpersonal Trust (IT), Social Tie (ST), Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Behavioral Intention to Use (BI), and Actual Usage (AU). SG, IT, and ST are external variables because they function as antecedent factors for PU (the main construct of TAM). As explained above, the addition of SG, IT, and ST as external variables was based on characteristics of the AIH Group. SG represents a characteristic of collective purpose to share knowledge among AIH members. Meanwhile, IT represents the existence of trust and ST represents the existence of emotional bonds among AIH members. PU, PEOU, BI, and AU belong to the original TAM proposed by Davis, Bagozzi, and Warshaw [9]. Each construct has its own indicators. In total, there are 32 indicators involved for all the constructs (see Appendix A). A common guideline in the Structural Equation Model (SEM) method is that the minimum number respondents must be five times of total number of indicators [11].

Data processing and analysis were conducted in two phases, namely the phase of the measurement model and the phase of the structural model [12]. The method used in the phase of the measurement model was Confirmatory Factor Analysis (CFA), while the Structural Equation Model (SEM) method was used in the phase of the structural model. The first phase aimed at ensuring appropriateness between model and data (goodness of fit of the model). The second phase was the main phase in this reseach, aimed at testing all hypotheses in the proposed model [12]. In this research, each hypothesis is a path depicting a relationship between two constructs. An hypothesis can be accepted of there is a strong relationship between two connected constructs. Data processing phases mentioned above were conducted using Covariance Based SEM-software, named LISREL. LISREL is the most widely used software for solving CFA and SEM problems.

**RESULTS**

Over two months, 215 respondents filled out the online questionnaire. Using the SEM method and based on the number of constructs involved in

**Table 1** Summary of goodness of fit

| Fit indices | Cut-off value | Results | Remark |
|---|---|---|---|
| RMSEA | $\leq 0.08$ | 0.061 | *good-fit* |
| 90% CI *for* RMSEA | *small* | 0.053 - 0.068 | *good-fit* |
| NFI | $\geq 0.90$ | 0.96 | *good-fit* |
| RFI | $\geq 0.90$ | 0.96 | *good-fit* |
| PGFI | $> 0.60$ | 0.67 | *good-fit* |
| $\chi^2$/d.f. | $\leq 3.00$ | 1.79 | *good-fit* |

**NOTE :** CI = *Confidence Interval*
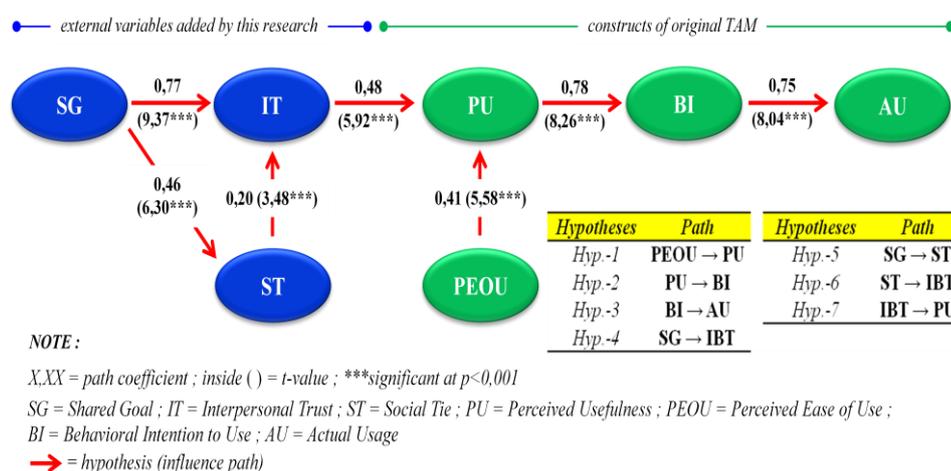


**Figure 1** Modified TAM

the proposed model, the minimum number of respondents required is 160 persons (five times the number of indicators). Thus, the respondents collected during the data gathering process were adequate for analysis. The majority of respondents were at ages from 25 to 30 years old, were career women, had bachelor degrees, and had been married for more than four years.

As explained previous, the first phase of data processing was the measurement model using the CFA method. Table 1 summaries results and cut-off values for each of the indices of fit.

Based on a comparison between results and cut-off values listed in Table 1, it can be determined if each fit indices passes the requirement. It can be concluded that the measurement model met the required goodness of fit. Thus, data processing and analysis can be continued to next phase, namely the phase of structural model. Next paragraph will describe the phase of structural model.

The proposed model in this research can be called "modified TAM". Figure 1 presents the modified TAM and includes the results of statistical testing using the SEM method. SG, IBT, and ST depicted in Figure 1 are the external variables of the original TAM as proposed by this research to improve the ability of the original TAM

to explain user acceptance. Based on the results of SEM testing depicted in Figure 1, it can be recognized that each path in the modified TAM shows a significant influence from independent variable to dependent variable. Hence, all hypotheses (hypothesis-1 through hypothesis-7) proposed in the modified TAM were accepted. From the Figure 1, it is showed that SG (Shared Goal) influences IT (Interpersonal Trust) and ST (Social Tie), and simultaneously showed that ST (Social Tie) also influences IT (Interpersonal Trust). Both IT (Interpersonal Trust) and PEOU (Perceived Ease of Use) influence PU (Perceived Usefulness). In sequence, PU (Perceived Usefulness) influences BI (Behavioral Intention to Use) and finally influences AU (Actual Usage). Thus, all hypotheses depicted in Figure 1 form a logical flow started by SG (Shared Goal) and ended by AU (Actual Usage).

**DISCUSSION AND CONCLUSSION**

SG (Shared Goal), IT (Interpersonal Trust), and ST (Social Tie) represent social factors influencing user acceptance toward an e-health-based social network as a medium to share knowledge about health. SG means the similarity of member's goals to share their knowledge through e-health. IT means the trust or belief which

is created among e-health based social network members. Meanwhile, ST means the emotional bond created among members. Based on the statistical testing depicted in Figure 1, it is concluded that user acceptance toward e-health-based social network is grounded by the existence of SG, IT, and ST.

The three external variables are important elements of social capital that can stimulate knowledge sharing activity to occur more intensively. The high intensity of knowledge sharing caused by social factors and the existence of ease of use will stimulate usefulness perceived by the e-health users. This higher perceived usefulness will be manifested as an actual usage of e-health based social networks as a knowledge sharing medium. Between usefulness and actual usage, there is a behavioral intention depicting a wish of a user to use e-health in the future. The sequence of causality explained above defines a background of user acceptance toward e-health-based-social networks as a medium to share knowledge.

The most important point in the modified TAM is how to strengthen SG (Shared Goal) among e-health users, because it is the basic foundation of the proposed model. In this case study, shared goal refers to mutual sharing of knowledge activity to improve understanding about pre-conception of pregnancy. Shared Goal among the members serves to maintain the athmosphere of knowledge sharing and to always prioritize a spirit of helping one another by responding the the other members' questions. Without Shared Goal, the knowledge sharing process cannot occur actively and continually.

The case study in this research focused on the AIH Group consisting of women with certain characteristics aforementioned. Between women and men, there are different tendencies predicted when using e-health. Furthermore in the case of an e-health based social network, women are predicted to share knowledge easier than men. Therefore, further research should be directed to evaluating the proposed model with male respondents.

## RECOMMENDATION

In order to intervene in the application of e-health-based social networks as a medium to share knowledge, there are external variables of TAM that must be noticed, namely shared goal, interpersonal trust, and social tie. Among the three external variables, it is important that the shared goal be the most significant social factor to consider. The shared goal will be attained easily if

the users who join in an e-health-based social network have a collective purpose to share knowledge. This can be realized if the users have been filtered since the begining. Filtering mechanisms may include a compliance sheet to be filled by the potential users. In addition, it also recommended to determine rules for guiding knowledge sharing activities. The presence of facilitators can support a process to attain the shared goal. Facilitators can be determined by the active members or chosen by an expert with appropriate knowledge.

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**APPENDIX A**

| Constucts | Indicators |
|---|---|
| Shared Goal (SG) | 1. Members in AIH Group share the same goal of learning and sharing knowledge about pre-conception of pregnancy. |
| | 2. Members in AIH Group have similar goal in order to answer other member's questions. |
| | 3. Members in AIH Group share the same value that helping other members is pleasant. |
| | 4. Similarity of goal makes AIH Group members being passionate and committed for sharing the knowledge. |
| | 5. Members in AIH Group always promoting the accepted values and norms to achieve collective goal. |
| Interpersonal Trust (IT) | 1. I can talk freely in AIH Group about my personal issue regarding pre-conception of pregnancy. |
| | 2. If I share my problem about pre-conception of pregnancy, I know AIH Group members will respond constructively and caringly. |
| | 3. I know most AIH Group member will do everything within their capacity to help others. |
| | 4. During knowledge sharing activity, AIH Group members always promoting honesty. |
| Social Tie (ST) | 1. I maintain close relationship with some members in AIH Group. |
| | 2. I know some members in AIH Group on personal level. |
| | 3. I have frequent communication with other members in AIH Group. |
| | 4. I spend a lot of time for interacting with other members in AIH Group. |
| Perceived Usefulness (PU) | 1. Facebook (Social Network Sites) enables the members to share the knowledge and ask every time-every where. |
| | 2. Getting answer can be obtained faster if using facebook (Social Network Sites) than using other media. |
| | 3. Using Facebook (Social Network Sites) enables me to learn something more interactive than other media. |
| | 4. Using Facebook (Social Network Sites) improves my insight about pre-conception of pregnany. |
| | 5. Overall, AIH Group useful to share knowledge, socialize, and ask about pre-conception of pregnancy. |
| Perceived Ease of Use (PEOU) | 1. I didn't take a lot of time to learn how to post a question, give my feedback during discussion, upload a file, etc. within AIH Group (Facebook). |
| | 2. I find it easy to be skillful in using Facebook as a medium to share knowledge. |
| | 3. It is easy for me to remember step-by-step to use Facebook facility. |
| | 4. Overall, I perceived if Facebook facility easy to be operated. |
| Behavioral Intention to Use (BI) | 1. If I were asked my opinion about AIH Group, I would like to say something favorable. |
| | 2. I intend to recommend my friends who have similar problem to join in AIH Group. |
| | 3. I intend to share the knowledge about pre-conception of pregnancy in the future although I am already pregnant. |
| | 4. I intend to answer other member's question more active. |
| | 5. I intend to actively discuss within AIH Group because it can improve my confidence to get pregnant soon. |
| Actual Usage (AU) | 1. I often participate in discussion by giving statement toward other member's postings. |
| | 2. I often give my support and suggestion for other members. |
| | 3. If I have questions about pre-conception of pregnancy, I used to ask within AIH Group. |
| | 4. I often participate in discussion by answering the question. |
| | 5. I feel more understanding about pre-conception pregnancy because I used to pay attention to the discussion that occurred. |

Measure of each indicator : seven-point likert scale

(1) : strongly disagree ; (4) : neither agree nor disagree ; (7) : strongly agree

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