The Influence of TRI Factor on The Use of IoTs Behavior Intention

in Bangkok Metropolitan

Kritiya Rangsom[1], Wasun Khan-Am[2]

[1]dept. of Information Systems
Faculty of Business Administration, RMUTT
Pathumthani, Thailand
e-mail:gritiya_r@rmutt.ac.th
[2] dept. of Information Systems
Faculty of Business Administration, RMUTT
Pathumthani, Thailand
e-mail: am.siamese@gmail.com

Abstract— this article is an ongoing article which was the consequence of the previous two presented articles in this journal which mentioned about explore the clear intention of using the Internet of things and analyze confirmatory factor analysis of the technology readiness index version 2.0 under the context of the Internet of Things. The objective of this research is to study the influence of Technology Readiness Index factors on the use of Internet of Things behaviors intention in Bangkok and its connection area, the results of the previous two articles will be used to form the research model. The research population is people who are living or working in the Bangkok metropolitan area with the internet user experience. The sample size is 402 respondents which are administered by the purposive method. By using structural equations with four latent variables including perceived usefulness, perceived ease of use, Technology Readiness Index 2.0, and Internet of Things usage behavioral intention. The result of the analysis is chi-square = 34.268, degree of freedom = 28, p = 0.192, Chi-square/df. = 1.224, GFI=.985 and RMR = 0.016. The most factor affecting the use of Internet of Things behavior intention is TRI factor.

Keywords-component; Technology Readiness Index; Technology Readiness and Acceptance Model; TAM; Internet Of Things

I. Introduction

Nowadays, the Internet of things is a trendy, and an interesting thing for study. Although there are not fully implements the platform, trendy use is the thing which is very interesting. In the first two published articles, we mentioned about TRI (Technology Readiness Index) and TAM (Technology Acceptance Model); and TRI confirmatory factor analysis. In this article, we would like to continue analysis factors in the concept of Technology Readiness and Acceptance Model (TRAM) under the Internet of things context. We need to study and determine which factor has an impact and a casual reason among factors in the structural equation model of behavioral intention to use the internet of things.

Since the objective of this research is to study direct and indirect influence of Technology Readiness Index factors on the use of Internet of Things behavior intention.

II. Literature Review

A. The Internet of Things

The Internet of things [1-2], aka IOTs, is a new phrase that is presented and has been in use since 1999 by Kevin Ashton under the project Auto-ID Center of the Massachusetts Institute of Technology. The goal of this center is to attempt to establish a world-class standard for RFID sensors. In addition, it would like creating interconnections among RFID receivers. In the following year, it has introduced with word “Smart” and put it in front of various electronic devices such as Smart device, Smart Grid, Smart Home. Kevin has therefore defined the technology as “internet-like”. Its’ meaning is the electronic device that is able to communicate and exchange information with each other. The word “Thing” appears in this phrase that means it will be able to implements for various electronic devices.

B. Methodologies

When Ajzan and Fishbein [3] developed theory of reasoned action (TRA) from Ajzan and Fishbein [4]. This theory aims to explain the relation among attitudes, subject norm, and behavior as following equation:

$$BI = (AB)W_1 + (SN)\, W_2$$

Where:
BI - behavioral intention
AB - one’s attitude toward performing the behavior
W - empirically derived weights
SN -one’s subjective norm related to performing the behavior

Devis [5,6] conveyed the idea of TRA and reproduces it again under the context of technology usage. He coined the Technology Acceptance Model (TAM) as the next figure.

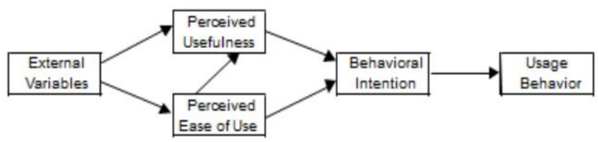

Figure 1. Final Version of Technology Acceptance Model (TAM) [7].

Parasuraman [8] developed Technology Readiness Indexed (TRI) which defined as “people’s likelihood to accept and use new technologies for accomplishing a goal in home life and at work”. TRI was developed to measure beliefs and thoughts toward the technology of an individual. it was divided into two groups including a positive and a negative group.

In 2014, Parasuraman and Colby [9] collaborated to create TRI 2.0 by reducing the number of items of TRI to an effective 10 items. They divided all items into two groups of a statement such as a motivator statement and an inhibitor statement. The motivator statement composes of optimism and innovativeness. The inhibitor statement composes of discomfort and insecurity.

Lin, Shih, and Sher [10] collaborate to create the Technology Readiness and Acceptance Model or TRAM. This model integrated TRI’s dimension, TAM’s perception of technology dimension, and behavior dimension together. Larasati, Widyawan, and Santosa [11] presented the model of TRAM in the next figure.

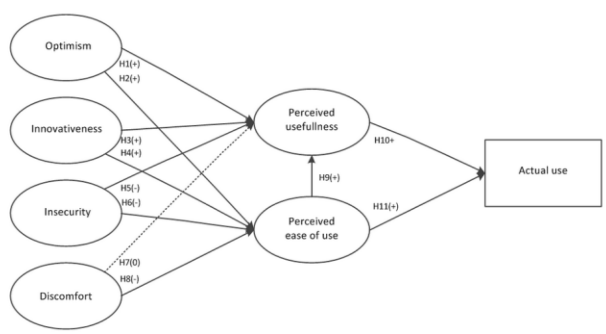

Figure 2. Technology Readiness and Acceptance Model (TRAM) [9].

Wasun and Kritiya [12, 13] implemented exploratory factor analysis and confirmatory factor analysis for reducing the observation variables to latent variables and confirm those reduced latent variables were consistent. The model of confirmatory factor analysis for Technology Readiness Index under the Internet of Things context shows in next figure.

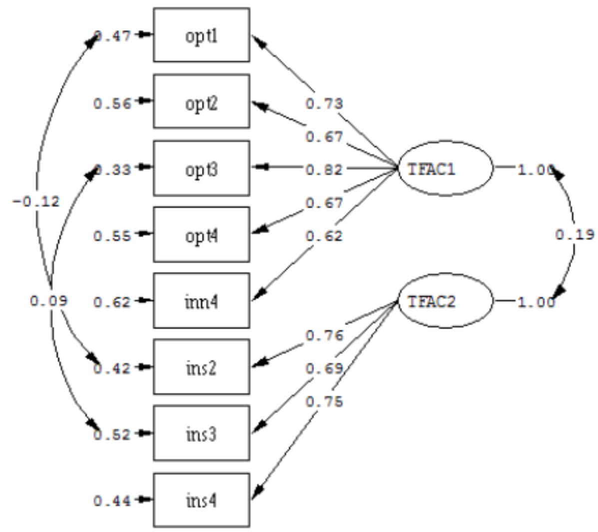

Figure 3. CFA of Technology Readiness Index (TRI) 2.0 [13].

In figure 3, the CFA reduce eight observed variables into two latent variables with name TFAC1 and TFAC2.

Wasun and Kritiya [14] presented a model that implements TRAM under Internet of Things context. That research model shows in next figure

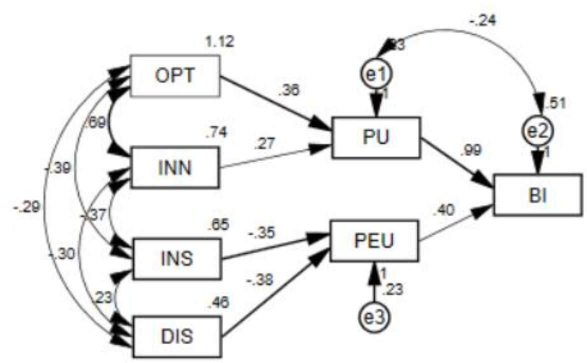

Figure 4. SEM of TRAM under Internet of Things [14].

n the previous figure, the motivator has a positive effect on the perceived usefulness of technology (PU). The inhibitor has a negative effect on the perceived ease of use of technology (PEU). In addition, the perceived usefulness of technology and the perceived ease of use of technology positive effect on a behavior intention to use the Internet of Things.

III. DESIGN RESEARCH

A. *Population and Sample*

The population in this research was defined as an Internet mobile device user who lives or works in an area of Bangkok Metropolitan. Therefore, the research area is both inside Bangkok province and the nearest area around Bangkok, specifically Pathum Thani province. The purposive method was chosen for this research sample, and by the implementation of Taro Yamane formula, the calculated sample size was computed and the result of accumulation was 384 samples. the number of questionnaires was added up 5% for the protection of some damaged or incomplete questionnaires.

B. Data Collection

For administrating to obtain precise and accurate data, all questionnaires in this study were collected by using the purposive method. The purposive respondents had to be asked some questions to ensure that their qualifications met a study requirement of this research. The research area was used for data collecting including the public area of Bangkok metropolitan including big discount store, transportation junction station, MRT or BTS big and junction station, and some office in a high building.

The questionnaire was defined to be used as a main tool for collecting data from respondents. It contents of five section those are knowledge about IoTs, factors affecting behavior intention, the use of IoTs behavior intention, internet usage behavior, and the last section, demography for describe character of respondent.

This study employs a 5 Likert scale for all question those measure as an interval scale including 5 – strongly agree, 4 – agree, 3- moderate, 2 – disagree, and 1 – strongly disagree.

C. Research Model

The model of this research was generate from literature review and two previous article results. The figure of model shows in figure 5.

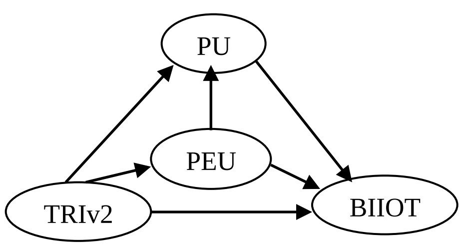

Figure 5. Research Model.

Where:
PU - Perceived of usefulness
PEU - Perceived Ease of Use
TRIv2 - Technology Readiness Index 2.0
BIIOT- Behavioral Intention using the Internet of Things

D. Hypotheses Defined

According to the research model, there are five hypotheses were defined as follow:

H1: Technology Readiness Index affects to perceived of usefulness technology
H2: Technology Readiness Index affects to perceived ease of use technology
H3: Perceived ease of use technology affects positively towards perceived of usefulness technology
H4: Perceived ease of use technology affects positively toward behavioral intention to use Internet of Things
H5: Perceived usefulness technology affects positively toward behavioral intention to use Internet of Things

All five proposed hypotheses have should been tested after structured equation model had already fitted and had been evaluated.

E. Statistics Analysis

This study employ structural equation model, called SEM, for model analysis, testing hypotheses, and finally find out those factors that affected respondent behavioral intention. The criteria of SEM shows as table below:

TABLE I. CRITERION OF STRUCTURE EQUATION MODEL

Statistics	Criterion
Chi-Square	-
Degree of freedom	-
Probability level	> .05
Chi-square/DF	< 2
RMR	< .05
CFI	> .90
GFI	> .90
RMSEA	< .05

IV. RESULT

After collecting data from respondents was conducted, then the damaged or incomplete questionnaire was classified out. A total of 402 questionnaires were brought to analyze and interpret. The outputs of that operation were demonstrated in five sections including reliability test, correlation test, fitted model, hypotheses testing, and direct and indirect influence of each factor.

A. Reliability Test

TABLE II. RELIABILITY TEST

Variable	Cronbach's Alpha
TFAC1	.825
TFAC2	.775
PU	.863
PEU	.866
BIIOT	.919

Refer to [14] the result of that article split TRI into two groups such as TFAC1 and TFAC2. The TFAC1 composed of OPT1, OPT2, OPT3, OPT4, and INN4. The

TFAC2 composed of INS2, INS3, and INS4. The alpha value of all component variables in the previous table is greater than 0.7 which interprets that all variable is suitable to analyze.

B. Correlation Test

The correlation test was implemented for relationship measurement between pair variable. The result of correlation test shows in next table.

TABLE III. CORRELATION TEST

Variable	PU	PEU	BI
TRI	.414**	.421**	.469**
PEU		.703**	.661**
PU			.576**

** Correlation is significant at the 0.01 level

In table III, Firstly, TRI has a correlation with PU, PEU and BI at the 0.01 level. PU has a correlation with PEU and BI at the 0.01 level also. Finally, PU has a correlation with BI at the 0.01 level too.

C. Fitted Model

After reliability and correlation test, the research model was created and tested consequently. The result of the model testing shows in figure 6.

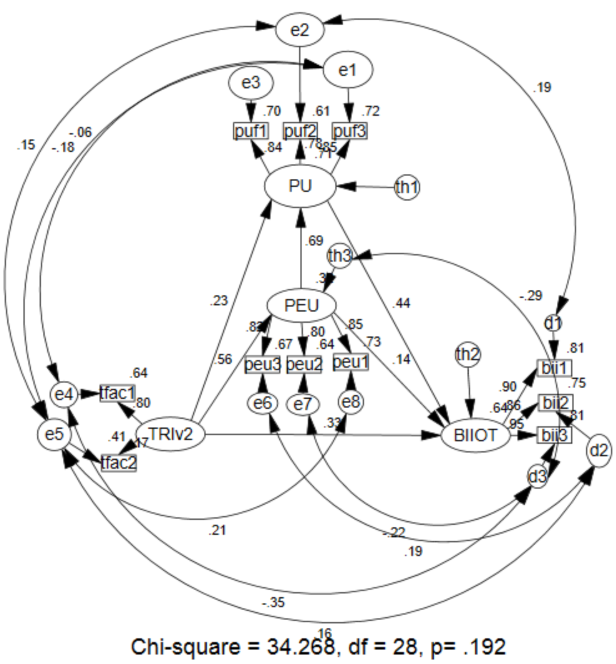

Figure 6. Fitted Model.

The statistical value of the fitted model presents in next table.

TABLE IV. CRITERION OF STRUCTURE EQUATION MODEL

Statistics	Criterion	Model value
Chi-Square	-	34.268
Degree of freedom	-	28
Probability level	> .05	.192
Chi-square/DF	< 2	1.224
RMR	< .05	.016
CFI	> .90	.998
GFI	> .90	.985
RMSEA	< .05	.024

The table IV shows that all statistical values of model pass a criterion of structure equation model such as p value = .192 greater than .05., the RMR = .016 less than .05, CFI=.998 greater than .90.

The next table presents an R-square value of three endogenous variables in this study.

TABLE V. R-SQUARE OF ENDOGENOUS

Variable	R-square
Perceive of usefulness technology	.709
Perceive ease of use technology	.316
Behavioral intention	.644

The R-square value of three endogenous variables is greater than 2.0 and appropriate enough for use.

D. Hypothese test

The next table shows five hypotheses testing that purpose in this study.

TABLE VI. HYPOTHESE TESTING

Hypotheses	p-value	Explanation
H1	.001	Accept Hypotheses
H2	.000	Accept Hypotheses
H3	.000	Accept Hypotheses
H4	.124	Reject Hypotheses
H5	.000	Accept Hypotheses

The above table shows that there are four accepted hypotheses including H1, H2, H2, and H5; and there is only one rejected hypothesis, H4.

E. Direct and Indirect Influence

The direct and indirect influence of TRI 2.0 factors on the use of IoTs behavior intentions and other factors in model shows in the next table.

TABLE VII. STANDANDIZE DIRECT AND INDIRECT INFLUENCE

Factor	Direct Effect	Indirect Effect	Total Effect
Perceived of usefulness	.439	-	.439
Perceived ease of use	.138	.303	.441
TRI v 2.0	.326	.349	.675

The above table shows that the most direct effect value is perceived of usefulness, the most indirect effect is TRI v 2.0, and the most total effect is TRI v 2.0 also. When considering only the total effect, the most value of the total effect is TRI v2.0, the second value of the total effect is perceived ease of use, and the least value of the total effect is perceived of usefulness.

V. CONCLUSION

According to the t-test value, exogenous and endogenous variables showed a significant relation. The result also showed that:

1. Technology Readiness Index affects to perceived of usefulness technology.
2. Technology Readiness Index affects to perceived ease of use technology.
3. Perceived ease of use technology affects positively towards perceived of usefulness technology.
4. Perceived usefulness technology affects positively toward behavioral intention to use Internet of Things.

All R-square values of the endogenous variable were more than .20, which was appropriate for implementation. when considering the number of influence value of each factor on IoTs behavior intention, it found that the total effect of TRI values has the maximum value.

In conclusion, all value of model statistics, together with an R-square value of endogenous variable indicate that the implementation of TRAM with behavioral intention to use Internet of Things is possible and reasonable. In addition, the TRI is a most factors which affect the behavior intention of using Internet of Things.

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