

Applying Innovation Characteristics in Technology Acceptance Model Innovation Acceptance Model

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Abstract— this article presents an idea about how to apply characteristic of innovation into Technology Acceptance Model (Innovation Acceptance Model: I-AM). The result is found that the application of innovation characteristic in TAM is possible under context of AEC diffusion for Pathum-thani people in Thailand by substituting perceived ease of use with: compatibility and complexity($b = .556$); and substituting perceive usefulness with: relative advantage and observability($b = .289$) ($R^2 = .707$, $TI = .839$ and $.289$ respectively).

Keywords: *I-AM; AEC; TAM; Innovation Diffusion; Innovation Characteristic;*

I. INTRODUCTION

A. Background

According to AEC phenomenon in Thailand and ASAIN country, people in this region have to change their life style to admit and conforms AEC blueprint. Some of them know about AEC, some do not. Although all ASIAN government has a lot of advertisement of AEC, people often know about word "AEC" but not know exactly what an AEC is? What they should do with AEC.

In Pathum-thani province, outskirt of capital of Thailand (Bangkok), there are several kinds of people who live here. Almost half of them are local people and the rest of them are migrants who came from capital of Thailand and other places. They have a many difference of characteristic such as life style, social position, occupation and so on. All things above make Pathumthanian have very interested people for studying in many aspects of data.

This research needs to survey an opinion of people who have a different aspect in AEC diffusion and their

AEC acceptance. This research tries to adapt innovation characteristics to Technology acceptance model.

B. Objective

The research objective aims to apply characteristic of innovation and TAM together

II. LITERATURE REVIEW

A. Innovation

The innovation is a one of popular word in this era. The new innovation often was produced and launch to the market. The meaning of innovation [1] are (1) *the introduction of something new*, (2) *a new idea, method, or device*. This word involve with something new. The AEC is something new for this region people.

There are five innovation characteristics [2] including: relative advantage, compatibility, complexity, trialability, and observability respectively. Due to AEC is not completely engaged in Thailand, the trialability characteristic is not involved in this research.

B. ASEAN

ASEAN [3] stands for The Association of Southeast Asia Nations. ASEAN was established on August 8, 1967 in Bangkok, Thailand. The ASEAN declaration was signed by 5 founders: Indonesia, Malaysia, Philippines, Singapore, and Thailand. Then five member: Brunei Darussalam, Viet Nam, Lao PDR, Myanmar, and Cambodia were joined later. Nowadays ASEAN have ten members.

C. AEC

AEC [4] stands for ASIAN ECONOMIC COMMUNITY. ASEAN leaders declared AEC is a goal

of regional economic integration by 2020. In ASEAN Economic Ministers Meeting 2006 in Kuala Lumpur, Malaysia, they have been a clear target and timelines for implementing AEC by 2015. With AEC blueprint, the ASEAN will transform into a region with free movement of goods, service, investment, skilled labor, and free flow of capital.

In this research, the transformation to AEC was used to make a questionnaire.

D. TAM

TAM [8-9] stands for Technology Acceptance Model. This model was introduced by Davis Fred. D. dissertation for more than twenty years ago. It is not new model, but it is a one of popular model to study and easy to modify or adapt. The basic model of TAM is

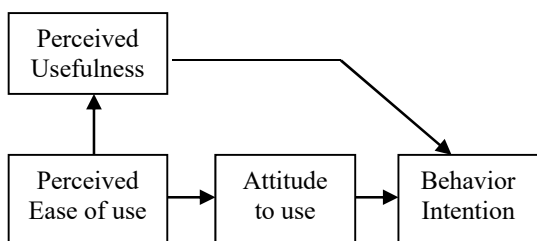


Figure 1. adapt from an original model of TAM to simplest model.

Where the meaning of variable show in next table:

TABLE I. MEANING OF VARIABLE IN DIAGRAM

Variable Name	Meaning
Perceived Ease of use(PEU)	The degree to which a person believes that using a particular system would be free of effort
Perceived usefulness (PU)	The degree to which a person believes that using a particular system would enhance his or her job performance
Attitude to use (AU)	The turning point that obtains an effect from PEU and PU

E. Attitude

The term attitude [5] is derived from Latin word aptus which is also the root of the word aptitude that means preparedness or adaptation.

The attitude theory classify in three types: (1) one component theory, (2) two component, and (3) three factors. The component of one component theory is affective. The components of two components theory are cognitive, and affective. The components of three component theory are cognitive, affective, and conative or behavioral. The meaning of each component [5] is shown in the next table.

TABLE II. MEANING OF COMPONENT OF ATTITUDES

Component Name	Meaning
Cognitive	our thoughts, beliefs, and ideas about something. When a human being is the object of an attitude, the cognitive component is frequently a stereotype, e.g. "welfare recipients are lazy"
Affective	feelings or emotions that something evokes. e.g. fear, sympathy, hate. May dislike welfare recipients.
Conative, or behavioral	tendency or disposition to act in certain ways toward something. Might want to keep welfare recipients out of our neighborhood. Emphasis is on the tendency to act, not the actual acting; what we intend and what we do may be quite different.

The theory of two components was applied in this research.

F. Pathum-thani[6]

Pathum-thani is set in the middle part of Thailand. Neighboring provinces are (from north clockwise) Ayutthaya, Saraburi, Nakhon Nayok, Chachoengsao, Bangkok, and Nonthburi.

Since Pathum-thani are: not far from Bangkok, low land cost, and civilization, most of Pathum-thani migrant came from Bangkok. However, there are still local people who were began their life from here.

III. METHODOLOGY

A. Population and Sample

In Department of Provincial Administration announcement [7], there are 1,033,837 citizens in Pathum-thani province. By using a Taro Yamane formula, the number of sample is 399.84 samples.

B. Sampling Method and Data collection

The quota sample is employed in this research. There are seven districts in Pathum-thani province. The sixty samples were collected from each district. The data collection was made at district office and some of municipality office. The respondent is a volunteer who willing to answer a question.

C. Statistics and Analysis

The collected questionnaires are classified in two groups, one for complete questionnaire and another for incomplete questionnaire. The complete questionnaires are processed with a computer program. The statistics were used as instruments to analyze data are factor analysis, and Structured Equation Model

D. Model Specification

In a theory of TAM, There are four factors but a startup model in this research has an adaptation by dropping variable BI, and changing a variable. The initial model of this research is:

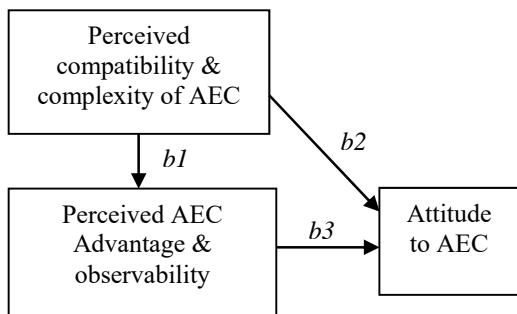


Figure 2. Initial model of research

Three of variables in the model above are made up from TAM: PEU for Perceived of Compatibility & Complexity, PU for Perceived of Advantage & Observability, and AU for Attitude to AEC. So that, there are two equations are produced as:

$$AU = b2PEU + b3PU \tag{1}$$

$$PU = b1PEU \tag{2}$$

Where *b1*, *b2*, and *b3* are a regression weight which are computed from a corresponded data

IV. RESULT

After finish a data collection and classification, the 385 complete questionnaires are processed by computer statistics program. There are three parts of result show in next section.

A. Factor Analysis Result

The analysis started from component analysis with Explorer Factor Analysis (EFA). In the analysis, the principal method and Varimax rotation are applied in this research. The results of this analysis are shown in the followed table.

TABLE III. ROTATED COMPONENT MATRIX OF PU

Variable Name	Component	
	1	2
Advan_1		0.821
Advan_2		0.810
Advan_3		0.832
Advan_4		0.846
Advan_5		0.786
Observ_1	0.785	
Observ_2	0.651	
Observ_3	0.890	
Observ_4	0.900	
Observ_5	0.897	

KMO = 0.885, $\chi^2 = 3736.999$, *df* = 45, Sig = 0.000

The table above shows that there are two components have been extracted from ten questions. The first component composes with Advan_1, Advan_2, Advan_3, Advan_4, and Advan_5 and names u1. The second component composes with Observ_1, Observ_3, Observ_4 and Observ_5 and names u2. In second component of this analysis, the variable observ_2 is dropped cause by its factor loading less than 0.7.

TABLE IV. ROTATED COMPONENT MATRIX OF PEU

Variable Name	Component	
	1	2
Complex_1	0.814	
Complex_2	0.815	
Complex_3	0.850	
Complex_4	0.897	
Complex_5	0.883	
Compat_1		0.796
Compat_2		0.829
Compat_3		0.843
Compat_4		0.853
Compat_5		0.811

KMO = 0.803, $\chi^2 = 3.041E3$, *df* = 45, Sig = 0.000

The table above show there are two components have been extracted from ten questions. The first component composes with Complex_1, Complex_2, Complex_3, Complex_4 and Complex_5 and names ez1. The second component composes with Compat_1, Compat_2, Compat_3, Compat_4, and Compat_5 and names ez2.

TABLE V. ROTATED COMPONENT MATRIX OF AU

Variable Name	Component	
	1	2
Feeling_1	0.695	
Feeling_2		0.821
Feeling_3		0.776
Feeling_4	0.820	
Feeling_5	0.834	
Opinion_1	0.643	
Opinion_2		0.851
Opinion_3		0.740
Opinion_4	0.833	
Opinion_5	0.823	

KMO = 0.835, $\chi^2 = 3.511E3$, df = 45, Sig = 0.000

The table above show there are two components have been extracted from ten questions. The first component composes with Feeling_2, Feeling_3, Opinion_2, and Opinion_3 and names f1. The second component composes with Feeling_4, Feeling_5, Opinion_4, and Opinion_5 and names f2. Both of Feeling_1, and Opinion_1 are dropped cause by their faction loading less than 0.7.

B. The correlation test Result

Firstly, three latent variables, PU, PEU, and AU, are calculated from six observation variables. PU is composed with u1, and u2. PEU is composed with ez1, and ez2. AU is composed with f1, and f2. Then the correlation among PU, PEU, and AU are tested. The result of test is shown in the next table.

TABLE VI. CORRELATION TEST

Variable Name	Variable Name		
	PEU	PU	AU
PEU	1.000		
PU	0.625**	1.000	
AU	0.710**	0.555**	1.000

** 0.01 level of significant

The correlation test table is shown each variable related to the other variable as follow:

1. PU has correlated with PEU
2. AU has correlated with PEU and PU

C. The Fitted Model

According correlation test, the Structured Equation Model was produced from collected data and initial model. The result of model fitting is shown in the figure below.

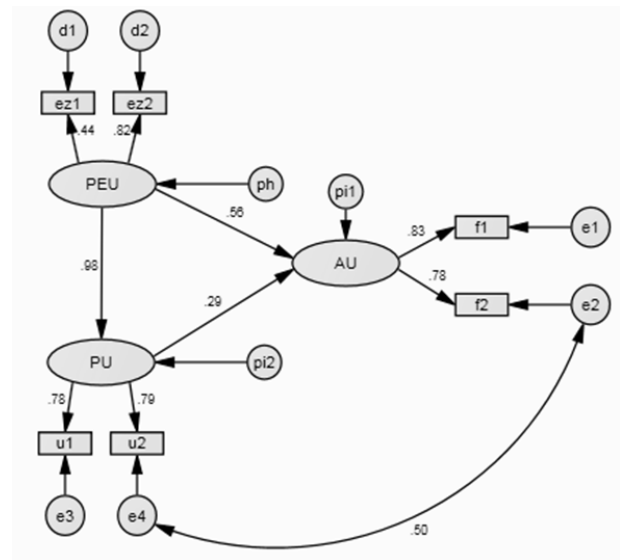


Figure 3. Fitted model of research

The statistics of fitted model are shown in table below:

TABLE VII. MEANING OF VARIABLE IN DIAGRAM

Statistic	Value	Criteria
χ^2	9.09	-
df	5	-
χ^2/df	1.818	< 2.00
P-value	0.10562	> 0.05
RMSEA	0.046	<0.05
RMR	0.012	<0.05
GFI	0.99	>95
AGFI	0.97	>95

TABLE VIII. STANDARDIZED REGRESSION WEIGHTS

Dependent	Predictor	Estimate
PU	PEU	.983
AU	PEU	.556
AU	PU	.289

The table above show relationship among three variable. The standardize coefficient between PU and PEU is .983. for AU variable, the standardize coefficient of PU is .289; and the standardize coefficient of PEU is .556.

TABLE IX. SQUARED MULTIPLE CORRELATIONS

Dependent	Estimate
PU	.966
AU	.707

Table above is shown the proper statistic for fitted model, and good prediction. With fitted model, there are two equations which are created as follow:

$$PU = 0.983PEU \tag{3}$$

$$AU = 0.289PU + 0.556PEU \tag{4}$$

The both equations above held in high coefficient of determination, $R^2 = .966$, and $.707$ respectively.

D. Effect on AU

There are three effect; direct effect, indirect effect, and total effect, among variables. All effect values are shown in next table.

TABLE X. EFFECT ON AU

Variable Name	EFFECT On AU		
	Direct	Indirect	Total
PU	.289	-	.289
PEU	.556	.433	.839

The table show most effect on AU is PEU, total effect =.839. The effect between PU and AU is at second, total effect = .289.

V. CONCLUSION

The research result is shown that to apply innovation characteristic in TAM is possible by replace perceived ease

of use with: compatibility, and complexity; and replace perceive usefulness with: relative advantage, and observability.

VI. LIMITATION AND FUTURE RESEARCH

The limitations of this research are:

This research has an adaption of TAM by dropping variable BI (Behavior Intention). The future research ought to include this variable for modeling full applying innovation characteristic into technology acceptance model.

All respondents of this research came from one province, although all of them are a volunteer who willing to answered a question. The future research ought to expand a respondent wider, may be five provinces from difference geographic.

This research did not concern about a demographic of respondent. The future research may add a demographic as a modulator of the model.

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