Identifying Technology Readiness Index Scale Under Internet Usage Context

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Abstract— This article presents Confirmatory Factor Analysis for identifying proper variable to create technology readiness index factor under internet usage context. Two aims of this research are to explore technology readiness opinion, and to identify factor of technology readiness index. This research conduct by using modified sixteen standard questions from previous research. The analyze was done with descriptive statistics such as mean and standard deviation, and analytic statistics including exploratory factor analysis with principle method and varimax rotation; Average Variance Extracted (AVE), Composite Reliability (CR), Alpha Cronbach Reliability Testing, Confirmatory Factor Analysis. The findings is firstly respondent have an opinion at agree level in motivated factor. There are three subjects that the respondent list in disagree such as technology is easy, depending of technology, and secure to use technology. the second findings is the EFA synthesis three factor, but the AVE value tell that the 1st factor and 3rd factor are good to fit (the value > .5), the 2nd factor AVE value is .39. Although not three AVE value is fit, but the CR value of three factors are over .7, so that means all factor are able to use. When validate all three factor with Alpha Cronbach testing, the value of three factors are over .7. The Confirmatory Factor Analysis show the fitted model with statistics such as $\chi^2 = 75.437$, df = 58, $\chi^2/df = 1.301$, p = .062, CFI = .979 , and RMSEA = .039

Keywords-component; Technology Readiness Index; TRI; Factor Analysis

I. INTRODUCTION

The world today is a digital world. Where humans and technology coexist Humans must take technology in their work. At the same time, new technologies are constantly being developed and brought to market. It gave rise to the concept of learning that humans would be ready to use new technologies. It goes back to the birth of the theory of rational action [1], which was the basis for the study of human behavior. Explain the belief and Attitude to Action Later, David used the theory to expand the technology. The theory is based on the technology adoption model [2] and in addition to the technology adoption model, in 2000, Parasuraman [3] published a Technology Readiness Index (TRI) scale, a tool that was introduced. Used to measure Technology readiness Used to indicate people acceptance of technology at home and at work. The scale is based on 36 questions. In 2015, Parasuraman and Colby [4-5] published their second work on the Technology Readiness Index, this time reducing the number of questions used from 36. There are only 16 questions left, and they are divided into four groups: the Motivator Statement, which consists of two sub-areas: Optimism and Innovativeness, the second group, Inhibitor Statements, is also composed of two sub-areas: Discomfort and Insecurity. The question that led to this research article is "Technology Readiness Index Scale" when measuring the opinions of the people of Thailand. The gauge continues to get the same results as the original or new? How?

Although the researcher has done one research on determining the TRI factor. But in previous research has done two years ago and asked respondents who were within the context of the Internet of Things, innovative among respondents. This new research implementation is set within the context of internet users. As the internet is a technology that all respondents have had the opportunity to experience and use. This research continues to establish the main goal of identifying the TRI factors.

The implementation of the questionnaire was conducted through Parasuraman and Coby's approach using 16 questions. [4, 6-7].

A. *Research Objective*

Since the background of research, there are two determined objective as:

1. To explore technology readiness index opinion
2. To identify technology readiness index factor

II. Research Methodology

A. *Population and Sample*

The population of this research is people who have experience in using the Internet via computers or smart devices. They must be a person who is willing to answer questions A sample was selected by using purposive method by collecting data from people who use the Internet via computers or smart devices. The sample size was calculated from 10 times the number of questions in this questionnaire. The questionnaire consists of 16 questions which base on the Technology Readiness Index question. Collection data period is 60 days.

B. *Tools*

The questionnaire was developed based on previous research. It was split into two section: the demographic section. And the technology readiness index section

Section 1, there are seven demographic questions: gender, age, marital status, income, mean of the number of days that the respondents used the internet, and the average of the time that the respondents used the Internet per one time. The question uses a nominal scale

Section 2, there are 16 questions on the technology readiness index. All questions in this section was adapted from previous research questions, and the research was conducted by Parasuraman and Colby. The 16 questions use 5 level interval scale as:

5 strongly agree
4 agree
3 moderate
2 disagree
1 strongly disagree

C. *Statistics*

[8] This research employed a descriptive statistics include arithmetic mean, and standard deviation to describe the behavior of the respondents. Exploratory Factor analysis was conducted in two steps performed. The first step is to validate the data suitability by examining KMO values, and Bartllet's test. The criteria for KMO value is greater than .07. and the Bartllet's test is significant. After the appropriate data was obtained, factor analysis was performed by Explorer Factor Analysis method. When the required component was taken, the lamda value of the factor was used to verify the suitability of the component. The Average Variance Extracted (AVE) and the Composite Reliability (CR) was calculated, and the criterion for the AVE value is greater than .5 and the criterion for CR is greater than .07 to obtain an optimal component. At last, the suitability of the factors was verified through the Confirm Factor Analysis method

III. Findings

After the questionnaire was collected successfully, the questionnaire was filtered into two groups: complete questionnaire and incomplete questionnaire. The completed questionnaire will continue to process while incomplete questionnaire will be discarded. When the above process was completed, it was found that The 200 questionnaires collected were complete. Therefore, all questionnaire were taken to process every batch.

A. *Descriptive*

The respondent technology readiness index answer is described by the arithmetic mean and standard deviation, the results are given in the table I.

TABLE I. Table Type Styles

Variable	Mean	SD.	Meaning
Motivator Statement			
Optimism			
OPT1	4.05	0.765	Agree
OPT2	4.16	0.71	Agree
OPT3	4.06	0.752	Agree
OPT4	4.12	0.727	Agree
Innovativeness			
INN1	3.84	0.918	Agree
INN2	3.21	1.035	Agree
INN3	3.76	0.811	Agree
INN4	3.9	0.845	Agree
Inhibitor Statement			
Discomfort			
PDIS1	2.705	0.92317	Moderate
PDIS2	2.63	0.98384	Moderate
PDIS3	3.07	1.22581	Moderate
PDIS4	2.45	0.97584	Disagree
Insecurity			
PINS1	2.4	0.91882	Disagree
PINS2	2.35	1.06921	Disagree
PNIS3	2.61	0.99643	Moderate
PINS4	2.585	1.08566	Moderate

From the table I, it found that the respondents agree with all motivator statement to enhance readiness for

technology ranging from OPT1 to OPT4 and from INN1 to INN4. On the other hand, they have a moderate opinion of three variables in discomfort group: PDIS1, PDIS2, and PDIS3; and also have a moderate opinion of two variables in insecurity group: PINS3 and PINS4. Moreover, they have a disagreed opinion with three variables: one variable of discomfort group: PDIS4 and two variables of insecurity group: PINS1 and PINS2

B. Exploratory Factor Aanalysis

Before starting exploratory factor analysis, the suitability of the data that can be used in the composition analysis or not. The test results show in the following table.

TABLE II. KMO AND BARTLETT TEST

Method Name	Test result	
	Name	***value***
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.0847
Bartlett's Test of Sphericity	χ^2	1130.299
	df.	120
	Sig.	0.000

From Table II, the results of the feasibility of factor analysis showed that the KMO value was .847 and the Bartlett test result was significant .000.

Since the KMO values are greater than .07, and the Barlett's test significance is less than .05, this indicates that the data are suitable for factor analysis. Therefore, the factor analysis was performed using the Principle component method. Consider appropriate values from Eigen values, select only elements with Eigen values greater than 1. The varimax spindle rotation method was selected, and after 5 rotations, the factor analysis results were obtained in the following table.

TABLE III. LOADING FACTOR

Variable name	Component		
	1	***2***	***3***
OPT1	0.741	-	-
OPT2	0.762	-	-
OPT3	0.796	-	-
OPT4	0.753	-	-
INN1	0.508	-	-
INN2	0.376	-	-0.723
INN3	0.574	-	-0.406
INN4	0.734	-	-
PDIS1	-	0.409	0.527
PDIS2	-	-	0.675
PDIS3	-	0.465	0.637
PDIS4	-	-	0.654
PINS1	-	0.468	-
PINS2	-	0.851	-
PNIS3	-	0.729	-
PINS4	-	0.745	-

Table III shows only the element weights greater than .3. In this component analysis, three components was produced. If only variable with weighted greater than .51 onwards were considered. The component 1 consists of 6 variable: OPT1, OPT2, OPT3, OPT4, INN3 and INN4. The second component consists of three variables: PINS2, PINS3, and PINS4. Finally, component 3 contains 4 variables: PDIS1, PDIS2, PDIS3, and PDIS4. The total weight of the three components is shown in the following table.

TABLE IV. EIGEN AND VARIANCE

Component	Eigen	% of Variance	Cumulative
1	3.774	23.586	23.586
2	2.561	16.003	39.589
3	2.502	15.64	55.23

From Table IV, the total possible variance was found to be 55.23, with the Eigen values of each component is 3.77, 2,561 and 2,502, respectively.

The Average Variance Extracted (AVE) and Composite Reliability (CR) was calculated after Factor Analysis operation. The results of these value were shown in the following table.

TABLE V. **AVE AND CR**

Component	AVE	CR
1	0.533	0.871
2	0.391	0.718
3	0.603	0.819

From Table V, although the AVE values for component 1 and 3 were greater than .5 but component 2 has an AVE value of .39 lower than .5. These indicated all component was not a suitability occurs. When looking at the CR value of the three components, they all ware higher than .7, indicating that it could be used as a factor without problems.

C. *Confirmatory Factor Analysis*

Perform a reliability analysis with Cronbach alpha to ensure that any variables were combined into factor well. The results of the analysis of each component are

TABLE VI. RELIABILITY TEST

Component	N of Items	Cronbach's Alpha
1	6	0.845
2	4	0.725
3	3	0.759

As the results of the Cronbach alpha reliability test, all factors were higher than .7, it was confirmed that the variables could be combined and be able to factor Therefore, it was used to confirm it with a confirmation factor analysis. After perform confirmatory factor analysis, the result of TRI factor is as follows.

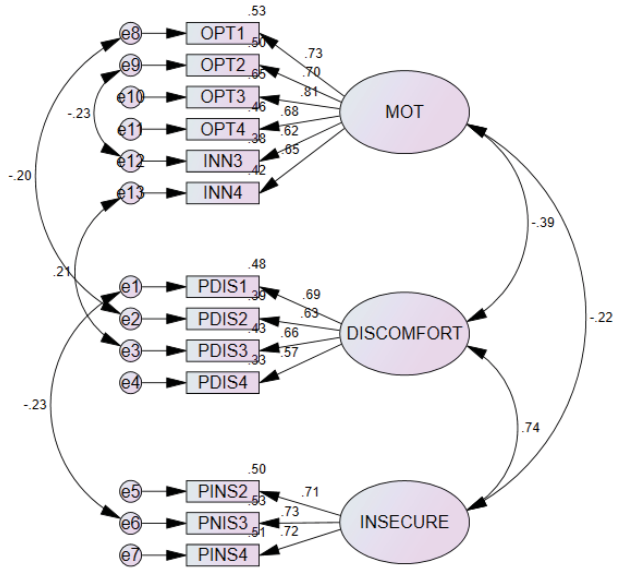

Figure 1. .Construction model of TRI

The model statistics were showed in following table:

TABLE VII. RELIABILITY TEST

Statistics	Criteria	Value
χ^2	-	75.437
DF	-	58
χ^2/DF	< 2	1.301
P	> .05	.062
GFI	> .9	.948
RMR	< .05	.049
CFI	> .9	.979
RMSEA	< .5	.039

From Table VII, it was found that all the statistical values obtained from the confirmatory factor analysis passed the criteria for construction a measurement model. This confirms that the measurement model for TRI component is suitable for use.

IV. SUMMARY

According to the research results, it was found that the respondents agree with all aspect of motivate statement in technology readiness index. In contract they are have a moderate opinions in 5 aspects of inhibit statement and disagree opinions in 3 aspects of inhibit statement. In terms of factor analysis, it was found that there were 3 factors, factor 1 consisted of 6 variables, factor 2 consisted of 3 variable and factor 3 consisted of 4 variables. The structural equation model was fitted with chi-square value is 75.437, the degree of freedom is 58, the relative chi-square is 1.307, CFI = .979, and RMSEA = .039. Factor is suitable for use.

V. DISCUSSION AND SUGGESTION

A comparison between the results of this research and previous studies [7] found that:

First of all, previous research involved two factors, but this research involved three.

Second, in previous research the motivator statement was factor 1 and consisted of all OPT plus INN4. This research it also incentivized factor 1 but consisted of all OPT plus INN3 and INN4. Factor 1 variant in this research was greater than in previous studies.

Finally, in previous research, the inhibitor statement was only factor 2 and consisted of INS2, INS3, and INS4. This study, It was a factors 2 and factor 3. This meant that not only were insecurities but also taking into account the discomfort as well

The simple cause of this difference can be due to the timing and context of use. This research follows two years of previous research, Thais may have been using technology more than 2 years ago. Therefore, in a rapidly changing world, ideas or conceptions related to the opinion of technology may be repeat research for new results following a dynamic world.

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