Implementation of Green Information Technology

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Abstract— This article present Green Information technology implementation behavior. The aim of this research are 1) to study implement green information technology. 2) To analyze relationship among attitude, subject norm, and green information technology implementation behavior. The research means is a questionnaire that was developed from the Theory of Reasoned Action, Ajzen, demography theory, and green information technology. The population is a citizen who works in Bangkok metropolitan. 500 samples was sampling by convenient method and only 489 questionnaires was classified to analyze. The statistics tools of this research consists of frequency, percent, mean, standard deviation, Cronbach's alpha reliability test value, and the selected data also manipulate by factor analysis and Pearson correlation test. The result found the most respondent age is between 21 and 30; and have a routine work with computer. The almost response in average frequently level implement green information technology is at high. The factor analysis extracts two factors from nine green information technology variables that were named: do with computer, and do in procedure. The hypothesis test show that there are a correlation among attitude, subject norm, and green information technology implementation. These is different pattern of those correlation in respondent who has age between 31 and 45. In addition, the pattern of those correlation is also different in all type of using computer for works.
Keywords green information technology; green it; green ict; Technology Readiness Index

I. INTRODUCTION

A. Backgournd

Now, we are in a situation of global climate change. Since it was dispreaded around the world, Global climate change became a big agenda of this time. All counties in the world attempt to find a way to stop or reduce this situation. Many countries and many parts of the country cooperate to do this. In technology part is no different, they also work hard to solve this problem. Scholars and professionals cooperated. They issue a guideline for environment saving, the GREEN IT or GREEN ICT. The core objective of GREEN IT is to encourage efficient using computers and to reduce using overcommitted resources. This guideline suggests users how to use a computer with less environmental impact. The GREEN IT guideline was implemented in Thailand and Other countries.

In Thailand, the GREEN IT guideline was declared in a Thailand ICT master plan since the first issue of the plan. The government [1-2] pushes a lot of effort into conducting this guideline.

B. Objective

The objective of this research are:

1. To study the practice of green ICT in Thailand.
2. To analyze correlation between factors such as attitude, subject norm; and behavioral intention

II. LITURATURE REVIEW

A. Green IT [3-6]

Green IT is an approach used to demonstrate the commitment and desire to improve the efficiency of the use of information technology. The main goal of this approach is to make the use of information technology in an environmentally friendly manner. This approach also encourages product design, factory production, agency management, vendor service, and service recipient practices that focus on low energy consumption in the environment. Every process and life cycle of products and services used.

From the manual document for reducing energy consumption according to the Cabinet resolutions for government agencies and state enterprises (2004), this document describes the practice to reduce energy consumption in 2 sections. the first section is about computer usage such as turning off the computer after use, should not leave the monitor on for a long time, unplugging when used, if the monitor is not used for more than 15 minutes, the monitor should be turned off. For paper-saving guidelines: print the smallest document you

can read, reuse the printed paper. print on duplex paper, use only recycled paper, save data on media instead of paper, use e-mail instead of fax, and use a printer capable of 2-sided printing.

B. TRA

Theory of Reasoned Action [7] is a theory of psychology. The theory is used to predict the intention of an action. It was developed by Martin Fishbin and Isaac Acsen [7-8] and used to study the relationship between attitude and behavior. It also Inherited the weak correlation between attitude metrics and consensual expression behavior theory [9] The rational action theory presents three key components: intention, attitude, and subjective norm. The correlation model is shown in the equation form, i.e. behavioral intention = attitude + subjective norm

The main idea of this theory is that a person according to this theory is likely to do something, take action, or commit it within a short period of time. According to this theory, the intention of the action approximates the behavior. The rationale behind this theory is that the individual's intentions construct related, and It is the motivation that attracts the person to act on their own will. In this research, Therefore, it is necessary to study whether attitudes and subjective norms affect the technology behavior of practitioners in compliance with green information technology?

C. Framework

The research framework was drawn from a TRA and Green ICT guideline and shown in next figure.

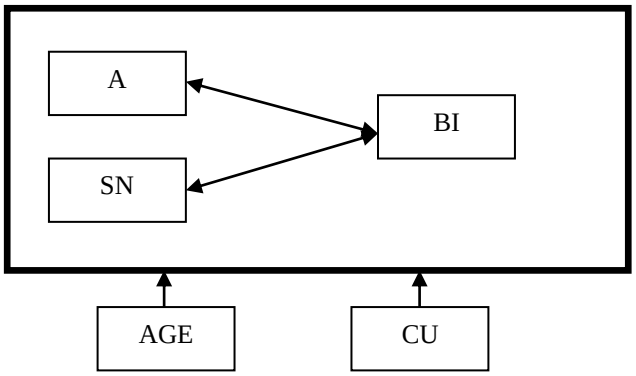

Figure 1. Research Framework.

In research framework, there are five variables. The meaning of these variable as:

- A is Attitude
- SN is Subjective Norm
- BI is Behavioral Intention
- AGE is AGE level
- CU is Type of computer usage

D. Hypothesis

In research hypothesis was formulated as follow:

H1: Attitude positive correlate with Behavioral Intention

H2: Subject Norm positive correlate with Behavioral Intention

H3: Age of user affects relationship between Attitude and Behavioral Intention

H4: Type of Computer Usage affects relationship between Attitude and Behavioral Intention

H5: Age of user affects relationship between Subject Norm and Behavioral Intention

H6: Type of Computer Usage affects relationship between Subject Norm and Behavioral Intention

III. RESEARCH DESIGN

A. Population and Sample

A research population is a person who lives or works in Bangkok metropolitan including Pathum-Thani.

Since the population is not different on study attribute, the research sample was sampled from a population with a convenient method. The sample size was computed by Yamane's [10] formula with a 5% error. The number is 396 samples. The researcher spared 104 samples to prevent questionnaire damage.

The place was used to administer the questionnaire was transportation junction such as victory monument, democracy monument, Pin-khlo port-station, Akamai port-station, and Rangsit port-station. We did not use a discount store due to those stores did not allow for conducting.

B. Statistics and Analyzing

The question with a nominal scale was analyzed with frequency and percentage. The question with interval scale was analyzed with mean, standard deviation. The hypothesis was tested by correlation.

The factor analysis was conducted to extract a component from the question.

IV. RESULT

A. Data Collection Result

Firstly, after data collection was conducted, the damaged questionnaire was classified away from a good questionnaire. The good questionnaire was transformed into electronic data. There were 489 pass questionnaires.

B. Descriptive Analysis

The first table describes age and type of computer usage and show as follow.

TABLE I. AGE AND TYPE OF COMPUTER USAGE DESCRIPTIVE

Variable	**result**		
	Value	***N***	***%***
Age	< 21	31	6.3
	21 – 30	222	45.4
	31 – 45	176	36

Variable	result		
	Value	***N***	***%***
	> 45	60	12.3
CU	Full-time	349	71.4
	Partial	140	28.6
	TOTAL	**489**	**100**

In table I, the most respondent age between 21 and 30. A 71.4% of respondent was a full-time using computer as an equipment.

The next table shows an average and standard deviation of GREEN IT practices.

TABLE II. GREEN IT PRACTICES

Topic	Mean	SD.
Turn off computer after use	4.07	.812
Unplug when used	3.99	.869
Turn off screen when not use > 15 mins.	3.79	.865
Print document with readable font size	3.46	1.046
Reuse printed paper	3.84	.931
Purchase only reuse paper	3.80	.905
Save eassential data in media	3.79	.923
use email instead of faxing	3.81	.980
Purchase 2-page printer	3.74	.982

In table II, all topic values of respondent are at much level (more than 3.51 and less than 4.5).

C. Factor Analysis

Since the guideline has 9 questions, the factor analysis was conducted to find a number of component and its element. the criteria of this operation is the loading factor over .5

From Table 3, it was found that the KMO value was higher than .7 with statistical significance at the .01 level, indicating that these 9 variables were suitable for use in factor extraction. The results of factor extraction from 9 variables can create two factors, with factor 1 being named the practice of work. It consists of 5 variables: 5) You reuse paper printed on one side for use on the other side. 6) You choose to use only paper that can be recycled. 7) You save important e-mails on the media. Instead of printing it out on paper 8) You use email instead of faxing 9) You buy a printer that can print on your own two pages. It consists of three variables: 1) You will not leave your computer on if you do not use it; 2) You will unplug it when you do not use it; 3) You will turn off the monitor after 15 minutes of inactivity.

TABLE III. GREEN IT PRACTICES

Topic	FAC1 (DW)	FAC2 (DC)
Turn off computer after use		.726
Unplug when used		.799
Turn off screen when not use > 15 mins.		.601
Print document with readable font size	.515	
Reuse printed paper	.760	
Purchase only reuse paper	.817	
Save eassential data in media	.812	
use email instead of faxing	.818	
Purchase 2-page printer	.753	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .852		
Chi-square = 594.229		
Degree of freedom =36		
Sig = .000		

The FAC1 named as DW that stand for *do-in-work*. The FAC2 named as DC that stand for *do- with-computer.*

D. Hypothesis testing

The testing process initiates a reliability test of attitudes towards green information technology practice and the subjective norm of green information technology practice. The test results are shown in following table.

TABLE IV. RELIABILTY TEST RESULT

Topic	Alpha-test value
Attitude	.868
Subjective norm	.875

From Table 4, the results of the reliability test revealed that attitude factor and subjective norm factor have Cronbach alpha-value higher than .7. they both passed the criterion of usage then they can be used as a factor in further proceedings.

After reliability test of two factors, the hypothesis I and II has conducted. The result of those test show in next table.

TABLE V. GREEN IT PRACTICES

	SN	DC	DW
A	.587 *** (.000)	.126** (.005)	.162** (.005)
SN		.131** (.004)	.148** (.001)
DC			.456*** (.001)

*.05,** .01, *** .001

According to Table V, attitudes correlated to subjective norm at the 0.001 level of significance with the moderate level (r=.587). It correlated with their behavior do-with-

computers at the .01 level of significance with low level (r=.126). It also correlated with their behavior do-in-work at the .01 level. Significant .01 low level (r=.162)

Subjective norm correlated with behavior do-with-computer at the low significance level of .01 (r=.131). It correlated with behavior do-in-work at significance level of .01 (r=.148).

Behavior do-with-computer correlated with behavior do-in-work at a significant level of .001. the level of this correlation was a moderate level (.456).

The next result is a summary table of the hypothesis test among variables. It was categorized by age period.

TABLE VI. CORRELATION CATEGORIZED BY AGE PERIOD

Age	Variable	SN	DC	DW
< 21	**A**	/	-	-
	S		-	-
	DC			/
21 – 30	**A**	/	-	-
	SN		-	-
	DC			/
31 - 45	**A**	/	/	/
	SN		/	/
	DC			/
> 45	**A**	/	-	-
	SN			-
	DC			/

Referring to Table VI, there was a similar correlation pattern of three age periods include <21, 21 – 30, and >45. However, the correlation pattern of age 31 – 45 was quite different. The next result is a summary table of the hypothesis test among variables. It was categorized by type of computer usage.

Referring to Table VII, the correlation pattern of the type of computer usage is different. By the way, the correlation test between attitude and the subjective norm was the same in both types of computer usage, they correlated. In addition, the correlation between Do-in-work and Do-with-Computer was the same too, they also correlated.

TABLE VII. CORRELATION CATEGORIZED BY TYPE OF COMPUTER USAGE

Type of Computer Usage	Variable	SN	DC	DW
Fully use	**A**	/	/	/
	SN		-	-
	DC			/
Partial use	**A**	/	-	-
	SN		-	-
	DC			/

V. CONCLUSION & DISCUSSION

A. *Conclusion*

According to the research finding, it was found that the most of the respondents were between the ages of 21 and 30. The nature of their work was a full-time computer job. There is a high frequency of green information technology compliance. in almost all subjects except for the printing of documents with a moderate level of practice frequency. When factor extraction was carried out from 9 green information technology compliance variables, 2 factors were extracted, namely, behaviors with computers and operational behaviors. In the hypothesis testing, it was found that There is a relationship between attitude and compliance with green information technology. There was a correlation between group conformity and green information technology compliance. different age ranges affecting the relationship between attitudes and compliance with green information technology The respondents aged 31 – 45 had different patterns of compliance with green information technology from other age groups and overall, different age ranges. This resulted in the relationship between group conformity and compliance with green information technology. The respondents aged 31 – 45 had different patterns of compliance with green information technology from other age groups and overall, different behaviors with computers. affecting the relationship between attitudes and compliance with green information technology by the group that uses computers not regularly will be different from the group that uses the computer regularly and overall How to work with different computers This resulted in the relationship between group conformity and compliance with green information technology. with no groups that are the same

B. *Discussion*

From the research, it was found that inability to apply the theory of action to describe the green information technology practice of the respondents in this research. The reason was the correlation coefficient between attitudes and the subjective norm was higher than the coefficient between attitudes and compliance to green information technology practice guidelines. In order to, it also was higher than the coefficient between subjective norm and compliance with green information technology practice guideline.

C. *Suggestion*

Although the research results show that the average frequency of green information technology adoption is high, which is an admirable level. However, the reported values were very high on the moderate side, its value was between less than 4 mostly. According to this value, businesses should be pushed more seriously in green information technology guideline practice.

The results of the research show that changing personal perceptions such as attitudes of information technology practitioners did not enable to achieve compliance with

green information technology guidelines. The factors such as subjective norm, social leader, or celebrity were still not affected IT practitioners to adopt green information technology guidelines. Therefore, it is noted that those who are interested can lead to further studies that What behavioral or theoretical factors influence IT practitioners to focus on green information technology?

The results of the hypothesis testing made an interesting point as to why technology practitioners aged 31–45 were more compliant with green information technology than other age periods. The tested results of this study gave rise to an important point of view What is the motivation of these aging technology practitioners? If an in-depth study of this group of technology practitioners can be conducted. The results of the study may be important answers that can be used to develop new ways to bring green information technology into practice.

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