

The Acceptance Model for Adoption of Information and Communication Technology in Thai Public Organizations

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Abstract

The purpose of this research was to study the factors that affect the success of Information and Communication Technology (ICT) adoption in Thai public organizations, including the effective application of ICT. We used quantitative research with quota sampling method in this study. The questionnaires were collected from 448 participants within 20 offices of the Permanent Secretary Ministries. Our closed and open-ended questionnaires were constructed based on the concept of Technology Acceptance Model (TAM). Data analysis was performed using Structure Equation Modeling (SEM). The research results found that factors related and impacted for ICT adoption in Thai public organizations were culture of usage, perceived usefulness, perceived ease of use, and application behaviors in using ICT.

Keywords: *Acceptance Model, Usage of ICT, ICT Adoption, Thai Public Organizations.*

1. Introduction

Each nation's culture is crucial for both society and its individuals. It causes the existence of different races, and requires mechanisms to create a cultural continuity within society. Additionally, the culture stimulates national development stability, conventional tradition, and local community tidiness. However, it implies that if we understand the culture clearly, we will understand the behavior of people in the society well [1].

Thai culture has passed the process of succession as ongoing parts of country heritage for a long time, although some culture formats or social contexts have been changed

from various factors. Nowadays, the culture changes are varied of social, economic, political, and technologies as the mainstream of the changes to all aspects of society [2].

The emergence of technology obviously impacted to Thai culture in 1985. During that time, the Thai government declared it as the year of information technology. Consequently, the revolution stimulated the growth of information technology, and brought the great changes into Thai society. It is not only prosperity, but also it affects all of societies, cultures, and psychological conditions [3], including various activities of Thais. Information technology in most organizations can be referred to information and communication technology as known as "ICT" [4]. Generally, people recently use ICT extensively, and is widely accepted in all vocational works. For example, ICT is applied into various uses, and rapidly adopted among Thai agencies to enhance their performance improvement programs. Moreover, ICT is used for communication across a broad range of domestic and international agencies [5].

The Thai government has a vision of the development of ICT. Reflecting both the economic and social development of the National Act No. 8 (1997-2001) to No. 10 (2007-2011), it is focused on the changes in information technology for both development and knowledge creation. This creation is defined by the strategy for economic restructuring and sustainable balance [6].

More than three decades, the government has used

information technology to improve the performance of various government agencies. Traditionally, it is for bureaucracy as a mechanism of effective government [7]. However, the development of information systems of various agencies has delayed significantly because of various problems, such as lack of clear policies in the organization. Currently, the global ICT has progressed significantly by changing to an enormous social well-being of work and life of mankind [8]. ICT plays its role and widely accepted by both government and private sector. For the government sectors, during the period of 2011 - 2020, Thai government has set the ICT policy framework as a direction for the next step in the country development [9].

The social changes are very competitive. It takes information and communication technology to operate an organization. It is concerned with the qualities of using technology by forming organization culture in cognitive perception, utilization, and acceptance of ICT. For personnel officers, they can use technology effectively. Fellow Davis and team's research presented the TAM Model in 1989 [10]. The model is explained, accepted, and used in technology for efficiency usage in organization. However, the organization culture was not mentioned in the original TAM model, especially for the efficient use of ICT. By simultaneous study the influential factors of organization culture, we extended TAM with the cultural impact. This can be adjusted for comprehensive and proper practice impacting to personnel officers in the organization as a cultural acceptance of information technology. In addition, understanding cultural impact on ICT can bring a new perspective to the organization for increasing productivity and improving quality of work in the future.

2. Theoretical Background

2.1 Technology Acceptance Model (TAM)

Technology acceptance is the individual's decision to use innovation or technology. Researchers and academics in the field of information system have tried to develop a model that can be explained and predict the technology acceptance behaviors. In fact, if we are able to understand or predict technology acceptance of a person, it will be advantageous for creating and presenting new technology for users [10].

Thus, there are many studies that mention about ICT acceptance, referred as TAM Model. In Fig. 1, the model is developed by the self-perception theory by simplified usage perception and self-ability perception [11]. There is

the same definition and significant meaning as innovation character in innovation spreading theory's complexity.

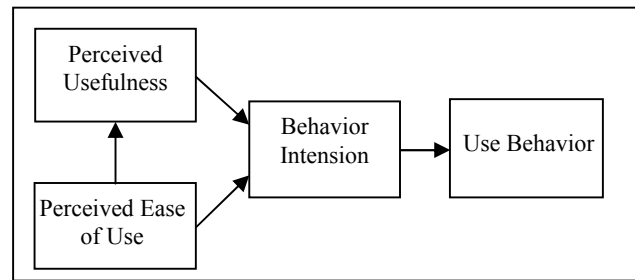


Fig. 1. TAM Model.

According to [11], the pattern of acceptance decision consists of 5 stages as follows.

- 1) Awareness Stage, person perceived that there is a concept but the participant does not have deep knowledge on the particular contents.
- 2) Interest Stage, This is the stage that person is interested in studying but the participant does not evaluate the real situation, just only increase his knowledge.
- 3) Evaluation Stage, person uses its intelligent for evaluation with its experiences
- 4) Trail Stage, This is the stage that a person makes some parts in real situation for confirming that it is as good of a result as its thought.
- 5) Adoption Stage, it is the last procedure for a person's acceptance to completely use and not use little as in the Trail Stage.

From the theories that are studied and presented above, the form of using ICT in Thai culture has passed through the stage of perception, learning, and applying. In this day, Thai culture has gained broad acceptance for ICT usage within many organizations. Each organization has its own idea to contribute technology adoption that depends on organizational culture, principle of perception, technology learning gap, knowledge gap, and different comprehension in factor of efficiently using ICT.

2.2 Organizational Culture

Organizational Culture is the system on value judgment, belief, comprehension, and standard of all members in the organization, including a person's expression behaviors which comes from social's environmental influence [13], [14]. From Fig. 2, the first successful information system might not be a success in other places because of the different factors in a workplace environment as follows: organizational culture, thought, procedure factors, material factors, and organization factors [15].

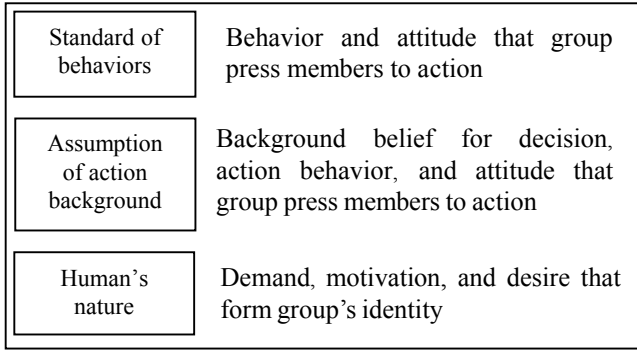


Fig. 2 Level of Organizational Culture Model [12]

Organizational culture is based on members' behavior and acts as follows: 1) Organizational members realized their culture from their history and take it as their norms. 2) Organizational culture is based on member relationship to align on the collectivism under philosophy and value judgment which everyone in the public accepted. 3) Organizational culture is standardized to control members' behaviors in an organization towards a pleasant way. 4) Organizational culture is related directly to efficiency and achievement in performance and productivity [16]. However, organizational culture has much effect to strive the performance of information and communication technology [17].

2.3 Information and Communication Technology

ICT arises from the integration of 2 technologies [18]. 1) Information technology is the cooperation of hardware and software for data evaluation, filing, reaching, data retrieval, presentation, and information distribution by electronic equipment. 2) Communication is equipment

and procedure in communication for reaching, exploring, speedily sending, and receiving information. ICT features are increasing in efficient works, including main factors to specify for cashing in competition [19]. Although end users will directly get profit from ICT utilization, in some case the unexpected events may happen in the step of ICT adoption because of the unfamiliar with ICT usage. These are important things because each user has a different experience and background. It makes different characteristic operations. The conclusion of usefulness is below [20]. Increased Individual Performance

- a) Easier and More Direct Implementation
- b) Enhanced Computer and Technological Literacy
- c) Increased Competitive Advantage
- d) Reduced Application Backing

ICT leads to network working that effect to relation control between chief and executives and effect to system structure and organizational culture [21].

3. Conceptual Model & Research Hypotheses

To study an influence of organizational culture on the acceptance in using ICT, including organizational culture of expectance, knowledge and skill in using ICT (cul_a), organizational culture of value in using ICT (cul_b), organizational culture of norm in using ICT (cul_c), perception towards benefits in using ICT (per_a), perception towards ease of use in using ICT (per_b), application behaviors in using ICT (usa_a), capability of application in using ICT (usa_b) and acceptance in using ICT (acc_a), the conceptual model in this research is established based on the fundamental concept of TAM as shown in Fig. 3.

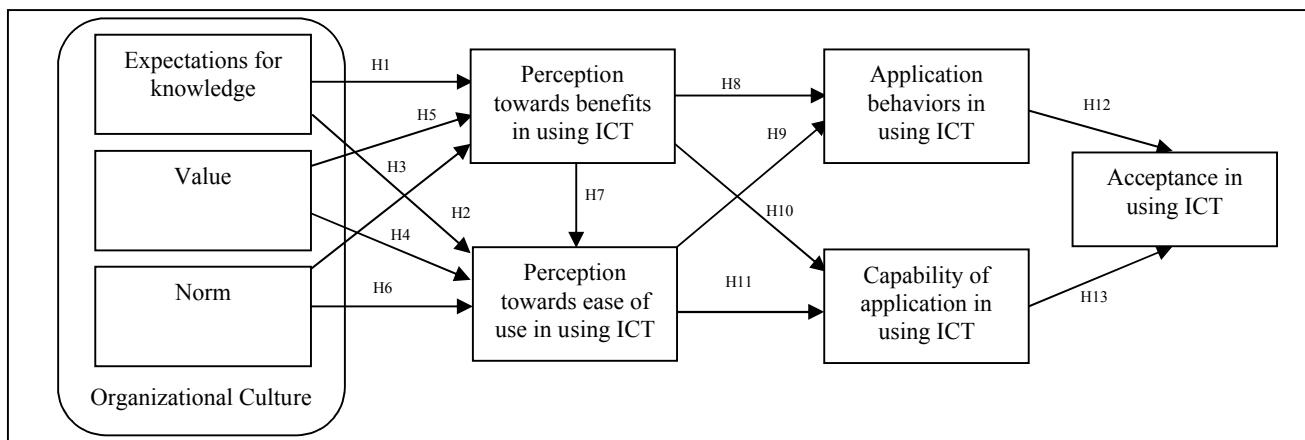


Fig. 3 Research Model

4. Research Methodology

4.1 Population and Sampling

The population of this research is the government officers in 20 ministries of the Permanent Secretary Offices who practically use ICT. The total population is 11,056 people. The researcher had set the process for determining the size and sampling as follows.

- a) We determined the sampling methods and applied quota sampling by collecting each ministry of 50 people, total number of samples is 1,000 people.
- b) The random samples were set in each organizational unit by using random sampling method. It generated the size of the sample in each agency to get a representative in each agency. The return questionnaires was collected on 814 units, and calculated in percentage as 81.4%. When it took into account the integrity of the content for structural equation modeling (SEM) analysis, the usable questionnaires have been dropped to 448 units.

4.2 Research Tool and Collecting Data

The research tool is the questionnaires that are collected from users who use ICT in the public sectors. The details of the questionnaires are divided into structural query in 5 parts as follows: 1) Demographic profile questions, 2) Organizational culture in using ICT, 3) Benefits and ease of use in using ICT, 4) Acceptance in using ICT, and 5) Open-ended questions for users' opinions about their organizational culture in using ICT.

4.3 Research Tool and Collecting Data

In this study, we have performed data analysis by using SPSS. The steps of analyzing can be summarized as follows.

- a) Analyze descriptive statistics for demographic profile, organizational culture of ICT usage, perception, adoption, and acceptance of using ICT in the public sectors.
 - 1) Analyze descriptive statistics for organizational culture that effect to perception, application, and acceptance in using ICT.
 - 2) Analyze descriptive statistics and the relationship between organizational culture of ICT usage and perception, application, acceptance of ICT.

- 3) Comparison analysis between culture of using ICT and acceptance, perception, application of using ICT by One-way ANOVA

- b) Analyze structural relation between organization culture and acceptance, perception, and application of using ICT, with analysis causal relationship and effect between organizational culture and perception factor, application factor, acceptance of using ICT factor. Researcher creates hypothesis model in the form of SEM to test and estimate the causal relationship, and examine the consistency of the structural model under the hypothesis with empirical data.

5. Research Results

After studying from both domestic and international papers, there are many documents that support the idea of acceptance in ICT or acceptance of innovation technology. It could be called the concept of technology acceptance. It means the process which caused the person to realize the benefits and ease of use in using ICT. Consequently, after trying and testing they had confidence which led to its technology adoption. The results of this research presented respectively as in Table 1.

Table 1: Demographic Profile of the Participants

<i>Personal Characteristics</i>		<i>Number</i>	<i>Percentage</i>
Gender	Male	199	44.42
	Female	249	55.58
Age	Lower 20 years	2	0.45
	20-29 years	152	33.93
	30-39 years	144	32.14
	40-49 years	101	22.54
	50-59 years	49	10.94
Status	Single	247	55.13
	Married	182	40.63
	Divorced	15	3.35
	Separated	4	0.89
Education	Lower Bachelor	45	10.04
	Bachelor Degree	274	61.16
	Master Degree	126	28.13
	Doctoral Degree	3	0.67
Organization Groups	ICT Management	8	1.79
	ICT Administrator	116	25.89
	ICT Users	229	51.12
	Others	95	21.21
Faculty	Related ICT	168	37.50
	Non-Related ICT	280	62.50
Job Duration	< 5 years	225	50.22
	6-10 years	135	30.13
	11-15 years	48	10.71
	> 16 years	40	8.93

Table 1: Demographic Profile of the Participants (Cont.)

<i>Personal Characteristics</i>		<i>Number</i>	<i>Percentage</i>
Training Periods	None	104	23.21
	1-3 times	281	62.72
	4-6 times	48	10.71
	> 6 times	15	3.35
Working on ICT / days	< 1 hours	13	2.90
	1-3 hours	65	14.51
	4-6 hours	180	40.18
	> 6 hours	190	42.41
Salary	< 10,000 bath	117	26.12
	10,000-19,999 bath	175	39.06
	20,000-29,999 bath	91	20.31
	> 30,000 bath	65	14.51

Table 1 shows the personal status data of replied samples in the term of frequency and percentage. Most participants are female (55.58%), age between 20-29 years (33.93%), single status (55.13%), education of bachelor degree (61.16%), organization groups of ICT users (51.12%), faculty study of non-related ICT (62.50%), experience job duration below 5 years (50.22%), training periods between 1-3 times (62.72%), working on ICT / days below 6 hours (42.41%), and receives salary between 10,000-19,999 bath (39.06%).

Table 2: The descriptive statistic of various factors associated with ICT usage

<i>Factors</i>	\bar{X}	<i>S.D.</i>	<i>Meaning</i>
Perception of ICT	4.17	0.66	High
Adoption of ICT	4.18	0.86	High
Acceptance of ICT	3.96	0.69	High

Table 2 shows the descriptive statistic of the factors related with ICT usage in Thai public sector. These factors are as follows: the perception of ICT usage, the adoption of ICT usage, and the acceptance of ICT

As shown in Table 2, the adoption of using ICT is the first factor that has the highest mean score of 4.18 and the standard deviation of 0.86. The second factor is the benefits and ease of use perception in using ICT that has

the mean score of 4.17 and the standard deviation of 0.66. While acceptance of ICT is the last factor that has the mean score of 3.96 and the standard deviation of 0.69.

According to the above results, we can conclude that the practical use of ICT in Thai government organization has been perceived, applied, and accepted with the high level. This evidence is concurrent with the process for technology acceptance of Rogers [11].

Table 3: Comparison analysis of organizational culture and ICT usage by using One-way ANOVA

<i>Hypothesis</i>	<i>F</i>	<i>Sig.</i>	<i>Interpretation</i>
Different organizational culture had no difference of effect on perceptions	4.11	0.00	Accept
Different organizational culture had no difference of effect on acceptance	5.41	0.00	Accept
Different organizational culture had no difference of effect on adoption	5.41	0.00	Accept

According to Table 3, we have performed comparative analysis for testing the effect from different organizational culture of ICT usage in Thai Permanent Secretary Offices. The results show that all hypotheses are not different from statistically significant at the 0.05 level. This evidence has led us to conclude that Thai Permanent Secretary Offices can setup the dominant policy scenario for governing ICT usage for the whole region.

With SEM analysis, the structure is in harmony with the empirical data based on a Chi-Square test. It is 582.950 Degrees of Freedom (df) equal to 504 p-value which equal to 0.008 at goodness-of-fit (GFI) is equal to 0.935. The adjust GFI (AGFI) is equal to 0.914 when the latent elements of culture, the use of ICT to realize its application and adoption of ICT. All of the elements are weighed at an acceptable level which is over 0.30. However, the latent variables of culture which are applied for ICT in the organization can be used to measure the actual culture in ICT usage.

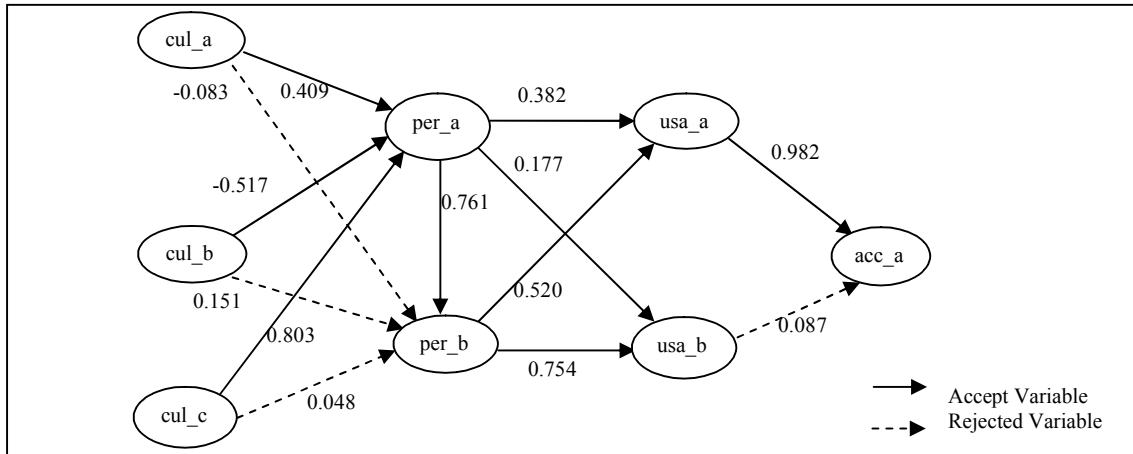


Fig. 4 Result of Structural Relation Analysis

Figure 4, the influential routes can be explained by the organizational culture of using ICT personnel in the public sectors. The results show that the researcher’s hypothesis model is coherent with the empirical data. Table 4 shows coefficients of variables that influence to the perception factors, application and acceptance of using ICT.

The value of R^2 for latent variables within this research model can be summarized as follows: 1) R^2 of per_a (perceived benefits of using ICT) is equal to 0.491, 2) R^2 of per_b (perceived ease of using ICT) is 0.694, 3) R^2 of usa_a (apply behavior of using ICT) is 0.821, 4) R^2 of usa_b (application of using ICT) is 0.298, and 5) R^2 of acc_a (acceptance of using ICT) is 0.919.

Table 4: Coefficients between variables and result of the linear structural factors affecting the organizational culture in ICT usage

Factor			Beta	S.E.	T-value	Sig. level
cul_a	--->	per_a	0.409	0.163	2.693	0.007
cul_a	--->	per_b	-0.083	0.092	-0.873	0.383
cul_b	--->	per_a	-0.517	0.233	-2.267	0.023
cul_b	--->	per_b	0.151	0.128	1.080	0.280
cul_c	--->	per_a	0.803	0.147	5.492	0.000
cul_c	--->	per_b	0.048	0.091	0.478	0.633
per_a	--->	per_b	0.761	0.058	11.898	0.000
per_a	--->	usa_a	0.177	0.058	2.919	0.004
per_a	--->	usa_b	0.382	0.108	3.737	0.000
per_b	--->	usa_a	0.754	0.069	11.439	0.000
per_b	--->	usa_b	0.520	0.103	5.925	0.000
usa_a	--->	acc_a	0.982	0.063	14.648	0.000
usa_b	--->	acc_a	0.087	0.037	1.956	0.050

Table 4 shows the results of path analysis that analyzed from the influence of Beta or Estimate Standard Error of Mean (S.E.), T-value, and Sig. level or p-value. The statistics are generally accepted to be t-value over 1.960 and p-value less than 0.05. The conclusions of hypothesis

testing for the organizational culture in using ICT for public sector organizations are shown below.

- H1.Organizational culture of expectance, knowledge and skill in using ICT has a positive influence on perception towards benefits in using ICT. (Beta Coefficient is 0.409.)
- H2.Organizational culture of expectance, knowledge and skill in using ICT does not affect perception towards ease of use in using ICT. (Beta Coefficient is -0.083.)
- H3.Organizational culture of value in using ICT has a negative influence on perception towards benefits in using ICT. (Beta coefficient is -0.517.)
- H4.Organizational culture of value in using ICT does not effect to perception towards ease of use in using ICT. (Beta Coefficient is 0.151.)
- H5.Organizational culture of norm in using ICT has a positive influence on perception towards benefits in using ICT. (Beta Coefficient is 0.803.)
- H6.Organizational culture of norms in using ICT does not effect to perception towards ease of use in using ICT. (Beta Coefficient is 0.048.)
- H7.Perception towards benefits in using ICT has a positive influence on perception towards ease of use in using ICT. (Beta Coefficient is 0.761.)
- H8.Perception towards benefits in using ICT has a positive influence on application behaviors in using ICT. (Beta Coefficient is 0.382.)
- H9.Perception towards benefits in using ICT has a positive influence on capability in application behaviors in using ICT. (Beta Coefficient is 0.177.)
- H10.Perception towards ease of use in using ICT has a positive influence on application behaviors in using ICT. (Beta Coefficient is 0.520.)
- H11.Perception towards ease of use in using ICT has a positive influence on capability of application in using ICT. (Beta Coefficient is 0.754.)
- H12.Application behavior in using ICT has a positive influence on acceptance in using ICT. (Beta Coefficient is 0.982.)
- H13.Capability of application in using ICT has a positive influence on acceptance in using ICT. (Beta Coefficient is 0.087.)

6. Conclusion and Suggestion

6.1 Conclusions

We collected data from sample group of 448 people from 20 ministries in offices of the permanent secretary in Thailand by collecting questionnaires and using SEM as a statistical analysis. From the research study, the results of influenced route can be explained for the efficiency of ICT adoption in Thai public organizational culture. In sum, we conclude on the focus points below.

- a) The correlation analysis of the variables shows that the organizational culture of using ICT is related to perception, application and acceptance of using ICT in the public sector.
- b) The analysis of awareness on the benefits of using ICT and ease of use of ICT shows that the personnel in the Thai public sector has a significantly high level of ICT awareness as well as the satisfaction in the application of use.
- c) The examination of the linear structural relation between organizational culture in use of information technology and communications shows the variance of the acceptance of use is at 91 percent. According to this empirical result, it can be considered that this linear structural relation model has significant reliability and can be accepted following the hypothesis specification.

6.2 Suggestions

The benefit of the research results has been expressed on core factors which are vital for the highest influence to the culture of using ICT in the public sector and the application in behavior of using ICT, and they affect the acceptance of using ICT. Moreover, the research results show that officers who perform activities related to ICT such as searching data, or browsing the internet. These groups are key elements on influencing the culture of using ICT which finally lead to the organization running profitably. Therefore, it should motivate people to use ICT in work and increase appropriated resources such as supporting adequate internet networks, computers, hardware and software to achieve a successful firm.

According to the prior suggestion, the implication of this work is to build the scales for evaluating the ICT culture in organization. In addition, other countries that have cultural norms as Thailand can apply our development scales for measuring the levels of ICT culture in their organizations and establish their own development framework for increasing the levels of effective culture for using ICT.

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