

# TECHNOLOGY ACCEPTANCE OF INTERNET TOWARD E-GOVERNMENT INITIATIVE IN NAVAL FINANCE DEPARTMENT OF ROYAL THAI NAVY

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## Abstract

*The explosive growth in Internet usage and the rapid development of e-commerce in the private sector has put growing pressure on governments to serve citizens electronically, which is often known as the "e-government" initiative. Because the Internet is a powerful tool, and provides a multitude of benefits, many government organizations are today considering accepting, and adopting Internet technology to provide government information and services in a better way. Based on a content study of technology acceptance of the Internet toward e-government initiative in the Naval Finance Department of the Royal Thai Navy, this article shows how the adopted Technology Acceptance Model (TAM) (Davis, 1989) is used to measure the acceptance of Internet use by naval officers in the Naval Finance Department for the e-government initiative. This Internet acceptance measurement will help the organization forecast how naval officer's perception of Internet use will affect and support the organizational development of the e-government initiative. The study analysis shows that the external factors influencing naval officers' perception on Internet use acceptance were: prior experience, job relevance, commitment, trust, and autonomy. The result can be used as a guideline for e-government implementation that leads to a successful e-government initiative in Thailand.*

*Keywords: E-Government, Technology Acceptance Model (TAM), User Perception.*

## 1 INTRODUCTION

The rapid growth in the use of the Internet and the emergence of e-commerce in the private sector has increased pressure on the Government to administer to citizens needs via this new medium; this is known as the e-government initiative. This e-government initiative was derived from administrative development and government reform (Lenk and Traunmuller, 2002). It is intended that the initiative use new and emerging information technology to support a transformation in internal operations and overall effectiveness of public administration (Fang, 2002). Hence, the e-government initiative presents a way for government to use information technology, particularly the web-based Internet for public administration, government process transformation, organizational transparency, and public communication. The government expects that e-government implementation will lead to a more flexible and effective government.

The Thai e-government initiative is based upon the way the government needs to reform its system. Thai government has developed E-Thailand, which is a national IT policy framework for the years

2001-2010. E-Thailand consists of e-government, e-society, e-education, e-commerce, and e-industry (www.e-gov.thaigov.net). Under this policy, e-government will be completed in 2010. The Thai government plans to use e-government to improve public administration and to support the economic and social development of the nation (Krutkaew, 2004). However, Internet usage for the e-government initiative is a new issue to Thai government organizations. It is difficult for government organizations to implement the e-government initiative because of their inflexible working processes and management. Furthermore, there are limited human and technology resources in many Thai government organizations. As Internet use is important for e-government initiative implementation, so the measurement of Internet use acceptance in public organizations is necessary to set up clear a direction for e-government initiative implementation.

The study of content in technology acceptance of the Internet toward the e-government initiative in the Naval Finance Department of the Royal Thai Navy will exemplify how a public organization accepts Internet use, leading to an e-government initiative. The empirical study of this research is expected to answer the two main questions. What are the external factors that influence naval finance officers' perception of Internet use in the organization? How can the Naval Finance Department improve both human and technology capacity to encourage naval finance officers to accept and use the Internet? The expected outcome will provide two contributions to public organizations. First, the study will help the Naval Finance Department develop its human and technological capacity by improving the prospect of Internet use in the organization for the implementation of the upcoming e-government initiative. Second, the study can be used as a guideline for e-government development in this organization as well as in other public organizations.

## 2 LITERATURE REVIEW

### 2.1 E-Government

E-government can be defined as “the utilizing of the Internet and World Wide Web for delivering government information and service to citizens (UNDPEPA and ASPA, 2002, p.1)”, or “the sum of all electronic communication between governments, citizens, and businesses, and the sum of product or services provided electronically by a government because of mandatory government regulations (Greunz et al., 2001, p.270)”. As recognized from these definitions, e-government requires multifaceted changes involving new and emerging technologies, especially the Internet and information and communication technology. Hence, e-government is being seen as a new challenge to public organizations in the 21<sup>st</sup> century (Gumersindo and Francisco, 2003).

E-government represents an innovative way of government (Liikanen, 2003), and also refers to the ability to obtain government services through non-traditional electronic means, enabling access to government information and transactions at anytime, anywhere, and in conformance with equal access needs. In addition, e-government offers the potential to reform the public sector and create a good relationship between citizens and government (Fang, 2002). In general, e-government can be defined as having six functions (Pardo, 2002): 1) E-government allows citizen access to government information. 2) E-government provides services that facilitate compliance with rules or regulations. 3) E-government offers citizens access to personal benefits. 4) E-government allows for electronic procurement including bidding, purchasing, and paying. 5) E-government provides government-to-government information and service integration. 6) E-government offers citizen participation. With regard to the functions of e-government, the practices of global e-government can be identified and divided into eight types, each of which can bring significant benefits to governments, citizens, businesses, employees, and other non-profit making organizations. Fang (2002) classified these e-government partnerships into eight categories, which are: Government-to-Citizen (G2C), Citizen-to-Government (C2G), Government-to-Business (G2B), Business-to-Government (B2G), Government-to-Employee (G2E), Government-to-Government (G2G), Government-to-Nonprofit (G2N), and

Nonprofit-to-Government (N2G). Generally, e-government delivers government information and services online through the Internet and other digital means. It indicates how information technology is adapted for government use (Bretchneider, 2003). Additionally, governments which have accepted Internet use have focused on improving information and communication technology to support actual online government services for citizen's use (Asian Development Bank, 2003). E-government offers the potential to reform the public sector and create relationships between citizens and government through Internet use of government web-sites.

E-government is considered as the reinvention of government action in an effort to reorient the focus of government operation from an inward-looking approach to an outward-looking approach by emphasis on the concerns of the citizen. This reinvented government is known as the e-government initiative. The e-government initiative refers to an initiative to provide public services and empower citizens and communities through information technology, especially through the use of the Internet (Ho, 2002). Currently, governments are attempting to use the Internet to change public administration to e-government by regarding citizens as the central focus in the design of an e-government delivery service (Osborne and Gaebler, 1992; Executive Office of the President of the United State, 2003). In this way, public organizations are challenged to think about how to partner citizens and organizations in identifying solutions and delivering effective public services. Hence, the change in public administration to e-government has caused a traditional bureaucratic paradigm (Kaufman, 1997) and shifted to a paradigm of an information-technology-based organization (Ho, 2002; West, 2004; New Zealand State Service Commission, 2004).

## 2.2 Technology Acceptance Model (TAM)

There has been much research carried out in an effort to formulate theories that measure the user's technological acceptance level and the determinants that affect technological adoption. (Taylor and Todd, 1995). Recently, a number of research studies have focused on a deep understanding of the determinants of usage by using intention-based models, which utilise behavioral intention to predict usage (Tarlora and Todd, 1995). Among various intention-based models, one of the best known is Technology Acceptance Model (TAM) (Davis, 1989). TAM, initially formulated by Davis (1989), uses TRA (Ajzen and Fishbein, 1980) as a base structure, and attempts to understand why people accept or reject information systems. TAM explains the links between a user's perceptions, which are: ease of use and perceived usefulness, and a user's attitudes, intentions and actual computer adoption behavior. The purpose of TAM is to explain and forecast user acceptance of information systems from measurements taken after a short period of interaction with the system (Davis, 1989).

TAM, introduced by Davis et al. (1989) (Figure 1), attempts to explain that a user's technology usage can be determined by their intention to use that given information technology. Then, in turn, the user's intention can also be determined by the user's perceptions toward that information system, consisting of perceived usefulness and ease of use. Finally, external factors have a direct effect upon perceived usefulness and ease of use, which have indirect effects on beliefs, attitudes, and intention.

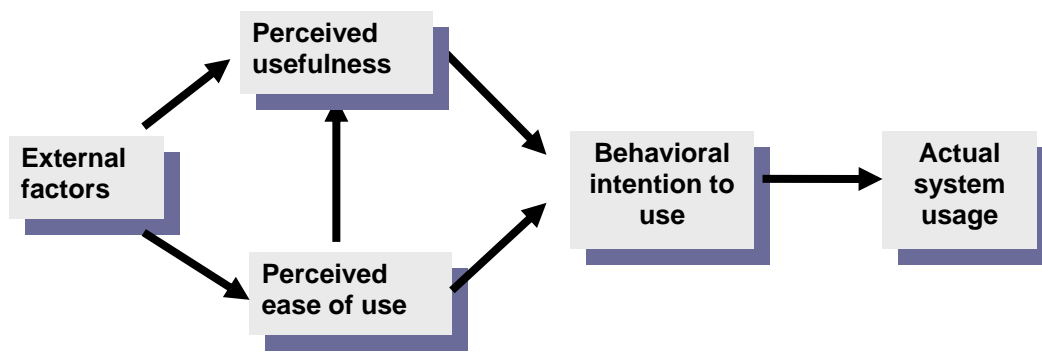


Figure 1. Technology Acceptance Model (TAM) (Davis, 1989)

### 3 RESEARCH FRAMEWORK

This research uses TAM as a base theory to determine the effects of external factors toward the readiness of the e-government initiative because of its capability for measuring user acceptance of technology as explained earlier. Moreover, Horton, et al. (2001) found that user acceptance of both the Internet and Intranet in an organization, can be identified by using TAM. For each external factor, the relation between its characteristics and the current e-government initiative will be shown. This study separated the external factors, which are the independent factors, into 3 main groups according to their characteristics; Individual Differences, Task Relevance and Environmental Surroundings.

External factors in the first main group, individual differences were found to have significant effects upon user acceptance of technology (Agarwal and Prasad, 1999; Mahmood et al., 2001). The hypotheses for each factor that tend to have the capabilities to influence public officer acceptance of the e-government initiative are shown below:

*Hypothesis 1: prior experience will have a direct positive effect on perceived usefulness towards the e-government initiative.*

*Hypothesis 2: prior experience will have a direct positive effect on perceived ease of use towards the e-government initiative.*

*Hypothesis 3: educational level will have a direct positive effect on perceived usefulness towards the e-government initiative.*

*Hypothesis 4: educational level will have a direct positive effect on perceived ease of use towards the e-government initiative.*

External factors, in terms of task relevance were found to have a significant effect upon the user's acceptance of technology in various empirical studies, such as the cognitive instrumental process (Venkatesh and Davis, 2000) or task-technology fit (Goodhue and Thompson, 1995), and as a result, the factors in this group were conceptualized to have the capability to influence e-government adoption. This is explained in further detail below:

*Hypothesis 5: Job Relevance will have a direct positive effect on perceived usefulness towards an e-government initiative.*

*Hypothesis 6: output quality will have a direct positive effect on perceived usefulness towards an e-government initiative.*

*Hypothesis 7: demonstrability will have a direct positive effect on perceived usefulness towards an e-government initiative.*

The final external factor group is environmental surrounding. The hypotheses for external factors in this group are based on the research of Mahmood et. al (2001) and Thatcher et. al (2002). Moreover, there are also other studies exclaiming external factors that have characteristics related to this environment surroundings group. These are image (Venkatesh and Davis, 2000), and subjective norm (Venkatesh and Morris, 2000; Venkatesh and Davis, 2000). The hypothesis for each factor is shown below:

*Hypothesis 8: commitment will have a direct positive effect on perceived usefulness towards an e-government initiative.*

*Hypothesis 9: commitment will have a direct positive effect on perceived ease of use towards an e-government initiative.*

*Hypothesis 10: trust will have a direct positive effect on perceived usefulness towards e-government initiative.*

*Hypothesis 11: trust will have the direct positive effect on perceived ease of use toward an e-government initiative.*

*Hypothesis 12: autonomy will have a direct positive effect on perceived usefulness towards an e-government initiative.*

*Hypothesis 13: autonomy will have a direct positive effect on perceived ease of use towards an e-government initiative.*

*Hypothesis 14: training will have a direct positive effect on perceived usefulness towards an e-government initiative.*

*Hypothesis 15: training will have a direct positive effect on perceived ease of use towards an e-government initiative.*

*Hypothesis 16: organizational support will have a direct positive effect on perceived ease of use towards an e-government initiative.*

*Hypothesis 17: organizational support will have a direct positive effect on perceived usefulness towards an e-government initiative.*

*Hypothesis 18: image will have a direct positive effect on perceived usefulness towards an e-government initiative.*

*Hypothesis 19: social influence will have a direct positive effect on perceived usefulness towards an e-government initiative.*

#### **4 RESEARCH METHODOLOGY**

This study used two research methodologies for gathering data, which were the TAM questionnaire and interview. In the first phase of data collection, the TAM questionnaire was used for the exploration of acceptance of an e-government initiative, which had been represented by intention of Internet use. The TAM questionnaire was used to measure naval finance officers' perceptions on Internet use in terms of perceived ease of use and perceived usefulness. Simultaneously, the questionnaire was used to find the relationship between the 12 external factors (independent factors) with dependent factors within the research framework of this study. The questionnaire for this study had 16 parts and was designed by using closed-end questions and a five Likert scale. To collect data, 150 TAM questionnaires were distributed to naval finance officers who work at the Naval Finance Department of the Royal Thai Navy. The data will be calculated by using a Stepwise Linear Regression model from the SPSS program and setting a significance level of 0.05 ( $\alpha=0.05$ ).

The interview was another method used for data collection on Internet use acceptance and the e-government initiative in the Naval Finance Department of the Royal Thai Navy. The findings of these interviews were used to support the results from the TAM questionnaires. The focal points for interview questions were: e-government development factors, e-government barriers, suggestions for e-government development, how public organizations have supported e-government, the way a public organization plans for information system development to support e-government, comment on Internet use, and suggestions for Internet use in a public organization. Naval finance officers at three different management levels were interviewed. This was to investigate the opinions of the interviewed naval finance officers from three management perspectives: top, middle, and operational management. The outcome of the interviews is important for the research data analysis, related to what causes technology acceptance of Internet use in a public organization.

## 5 DATA ANALYSIS

A total of 150 questionnaires were sent out and 124 were returned, indicating a response rate of 83%. The sample size is quite small. The higher sample size will provide more accurate and precise results for the researchers. However, in this research, 150 public officers were chosen because they represented all of the population of public officers in the Naval Finance Department.

The 46-item TAM instrument needed to be tested for its validity and reliability. For reliability, it was investigated by using Cronbach alpha, showing that the alpha values ranged from 0.7068 to 0.9296, where there is a large Cronbach alpha, this usually means that the measurements are reliable (Straub, 1989). For content validity, the instrument was assumed to have valid content as it was comprised of representative questions from various empirical TAM studies with previously tested question validity. In this study, the various TAM questions were drawn from the question models of Al-Gahtani and King (1999), Vankatesh and Davis (2000), Thatcher et al. (2002), and Agarwal and Prasad (1999), all of which have high proven content validity. Construct validity means that the items chosen are true constructs, describing the event or merely artifacts of the methodology itself (Straub, 1989). Construct validity was completed by examining its discriminant validity. To measure discriminant validity, the questionnaire was tested by Bivariate analysis, specifying Pearson, to measure whether there was less correlation across different methods. The resultant Discriminant validity indicated correlations across each method as equal to, or lower than 0.7 ( $R \leq 0.7$ ), which means there is high construct validity, because correlations equal to 0.7 or lower are acceptable (Ping, 2002).

| Dependent Variable    | Adjusted R <sup>2</sup> Change | Independent Variable  | Standard Coefficient | t        |
|-----------------------|--------------------------------|-----------------------|----------------------|----------|
| Intention to use      | .202                           | Perceived usefulness  | .285                 | 3.878*** |
|                       | .038                           | Perceived ease of use | .203                 | 2.674*** |
| Perceived usefulness  | .324                           | Job relevance         | .309                 | 5.936*** |
|                       | .062                           | Perceived ease of use | .291                 | 3.629*** |
| Perceived ease of use | .078                           | Commitment            | .231                 | 3.236*** |
|                       | .058                           | Prior experience      | .107                 | 3.013*** |

Table 1. External Factors and TAM – Result of Hypotheses Testing.

The table shows that both job relevance and perceived ease of use have a high effect upon perceived usefulness, indicating that the combination of perceived ease of use and job relevance can predict 38.6 percent of the variance in perceived usefulness (adjusted R<sup>2</sup>=0.386) at the significant level (Sig. = 0.00). Meanwhile, the regress coefficient between perceived usefulness and perceived ease of use is equal to 0.291, and the coefficient between perceived usefulness and job relevance is equal to 0.309. Thus only H5 is supported, while H1, H3, H6, H7, H8, H12, H14, H17, H18, and H19 are not supported.

The result from the table also indicates that the combination of prior experience, commitment, and social norm can predict 13.6 percent of the variance in perceived ease of use (adjusted  $R^2=0.136$ ) at the significant level (Sig. = 0.003). Meanwhile, the coefficient between perceived ease of use and prior experience equaled 0.107, and the coefficient between perceived ease of use and commitment equaled 0.231. Thus H2 and H9 are supported, whereas H4, H11, H13, H15, and H16 are not supported.

The overall correlations between each factor are shown as follows:

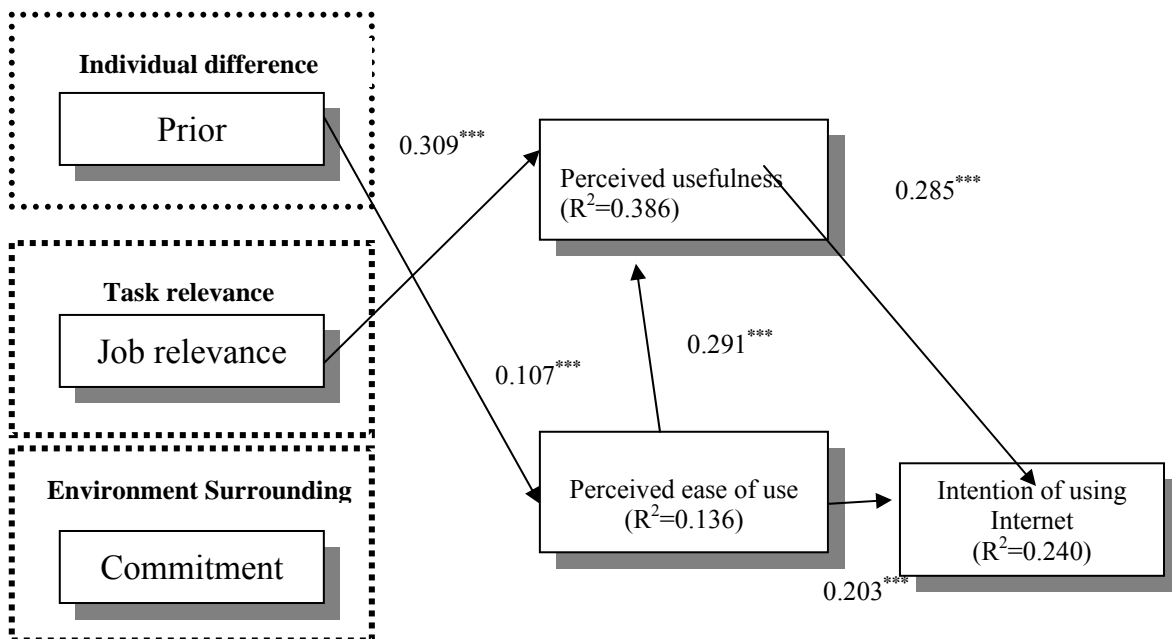


Figure 2. Research Framework Outcome

The interview results related to e-government demonstrate that naval finance officers at all three management levels have the same understanding and perspective toward Internet use and the e-government initiative. They all understand that e-government is a national policy; whereby, the government will implement an electronic system and the Internet for government operational efficiency and effectiveness, in order to provide incentives for improvement to government organization. However, to successfully implement the e-government initiative in the Naval Finance Department, naval officers at all management levels agreed that the factors for successful e-government development should be divided into human and technology factors. For the human factor, well-trained personnel who are capable of using IT and IT people who are capable of developing information systems for the organization are important for successful e-government development. For the technology factors, sufficient IT equipment to support all requirements of naval finance officers is necessary. Also, integrated system networks with other naval departments and other public organizations are necessary for successful e-government development.

Furthermore, the naval finance officers at all three management levels concurred that the barriers to the e-government initiative in this organization could be separated into human and technology factors. There are three barriers in terms of human factors that prevent the organization achieving e-government initiative implementation. First, the naval officers lack advanced computer knowledge and the skills to implement new information technology, in support of organizational use. Second, there is a lack of knowledgeable IT experts in both information technology and the government finance and accounting fields, who are capable of organizational information technology development in the Naval Finance Department, aimed at implementing the e-government initiative. Third, the link between

Internet use and the existing work to support organizational performance is not clear. The majority of naval finance officers does not have a clear understanding on how the Internet is relevant to their work and can be integrated into the existing working process, in order to provide benefits to individual performance as well as organizational performance. There are two barriers in terms of technology factors that also prevent the e-government initiative implementation in the organization. First, there is insufficient IT equipment for the use of all naval finance officers. Actually, the organization does not provide enough IT hardware and software to meet the demand of all naval finance officers. Second, there is a non-integrated system network with other naval departments and other public organizations. This problem causes ineffective and inefficient use of information systems to support the organizational work performance. It also decreases progress of e-government initiative implementation in the organization.

## 6 DATA DISCUSSION

The results showed correlations that both perceived usefulness and perceived ease of use have a significant impact on the user's intention. Additionally, perceived ease of use was found to have a significant correlation with perceived usefulness. The linkage between user's perception and intention can be explained from a cost-benefit perspective (Davis, 1989). When new information technology is perceived to be useful, users will have a positive attitude toward its benefit. At the same time, when users perceive new information technology to be easy to use, the cost perception on new information technology decreases because users would perceive that they will put less effort into using this new technology. As a result, the perception of the increase in benefit and the decrease in cost would lead to an increase in positive perception toward new information technology, which would eventually lead to a higher intention to use the new technology. In addition, perceived ease of use affects perceived usefulness because when users perceive that new information technology helps them put less effort into its use, they will have more time and be able to put greater effort into other jobs. As a result, job performance is increased (Davis, 1989).

In terms of prior experience, there is significant correlation between prior experience and perceived ease of use. When people have experience using specific information technology, they will tend to know its functions and how to use them; therefore, becoming more familiar with that information technology. As a result, they will perceive it easier to use than those who have less experience. From empirical research studying prior experience, Taylor and Todd, (1995) and Venkatesh and Morris (2000) found correlations between prior experience and success in implementing new technology in a company. Livingstone et al. (2002) found that experience can positively change a user's attitude toward new information system usage. Prior experience can also be linked with computer anxiety, as hypothesized by Venkatesh (2000), explaining that when people gain more experience with information technology, they tend to reduce their perception of computer anxiety. This reduction in the level of a user's computer anxiety would reduce negative perception toward using information technology.

When information technology provides features and supports that relate and fit to the characteristics and requirements of a task, the users will find it useful, and tend to have positive attitudes toward new information technology (Goodhue and Thompson, 1995) which may be resulted in the significant correlation between job relevance and perceived usefulness by public officers in the Royal Thai Navy. Moreover, commitment demonstrated significant direct effects on beliefs about ease of use, leading to workplace information technology use. When people have a strong commitment to companies, their competencies are increased in order to perform their work more efficiently. This attitude of motivation makes them more curious and inquisitive to learn the new system (Kanfer and Ackerman, 2000). As a result, they will find the new technology system easier to use than those who do not have strong commitment to their companies. Venkatesh (2000) also found that, when people are curious and have the motivation to learn a new information system, they will increase their computer playfulness perceptions and, at the same time, decrease their computer anxiety perceptions. Therefore, users tend

to underestimate the difficulty of the methods or processes of using a new information system because they do not perceive it as difficult; when compared to those who have less computer playfulness perception. Moreover, other research in this area found that a higher level of playfulness perception will lead to lower perceptions of effort (Deci, 1975; DeCharms, 1968). Therefore, stronger commitment in the work place will lead to a higher perception of ease of usage towards the new information system.

Training was found to have no significant correlation with either perceived usefulness or perceived ease of use by TAM. However, from the interviews, all three different management levels believed that training was an important factor for increasing Internet use by public officers. They asserted that training programs provided for the officers would help reduce their anxiety and make them more familiar with Internet use. Also, these public officers believed that training could be an important factor affecting successful e-government initiative implementation by increasing positive perceptions toward perceived ease of use through its direct positive effect with prior experience. This correlation between training and prior experience was found in studies, by Kim and Lyons (2003), and Yi and Davis (2003). They premised that an effective training program is a major contributor to organizational performance by increasing trainees' skills to perform their work. Moreover, the trainees will gain a great deal of knowledge and experience during training which will lead to an increase in organization competencies (Korsten, 2003). Therefore, training is an important factor for implementing the e-government initiative because of its positive direct effect upon prior experience.

To conclude, successful e-government initiative in this study was measured by the user's intention to use the Internet. The outcome showed that their intention was directly affected by their perceptions, on both usefulness and ease of use with regards to Internet usage. Additionally, the results also showed a direct effect of perceived ease of use on perceived usefulness. There are also three external factors affecting the Royal Thai Navy officers' perceptions, prior experience, job relevance, and commitment. Job relevance had a direct effect on perceived usefulness, while prior experience and commitment had a direct effect on perceived ease of use. Training is a factor that can influence perceived ease of use through their positive direct effects of training on prior experience and trust and autonomy on commitment. Hence, according to the large number of external factors, it can be explained that the e-government initiative is influenced by external factors involving all three main groups; individual difference, task relevance, environmental surroundings, as was hypothesized in the research framework. While these external factors could be explained as intention-based factors, the IT infrastructure problem also affects the e-government initiative. From the interviews, the IT infrastructure problem requires support with adequate information technology equipment and staff who have expertise in the information technology development field. Even though the public officers accept Internet use, this technology factor could be a limitation of successful e-government initiative (Moon, 2002).

## **7 CONCLUSION AND IMPLICATION**

The outcomes of this study have provided imperative implications for both researchers to the literature of TAM design and naval officers of the Royal Thai Navy. The study presents a comprehensive analysis of user acceptance of new information technology use through an intention-based model of TAM, the research model. This model offers full understanding of the idea of which factors are capable of affecting a sample group's perceptions and acceptance of Internet use. The same concept of this adopted TAM can be used to measure the acceptance of other information technology types such as Enterprise Resource Planning (ERP), Knowledge Management System (KMS), etc. This study used the adopted TAM to measure Internet use acceptance by naval finance officers for the e-government initiative implementation in the Naval Finance Department of the Royal Thai Navy. However, enabling e-government initiative implementation in the Royal Thai Navy requires cross-functional work within all departments and collaborative work with other public organizations. Hence,

the adopted TAM can be used to measure the acceptance of Internet use by different user groups in other naval departments or in other public organizations for the future research.

The outcomes of this study provide important implications for the Royal Thai Navy. The research implications will help the organization design the appropriate means to encourage naval officers to use effectively the Internet. As a result, this will improve the prospect of Internet use in the Royal Thai Navy and gear up the organization to the upcoming e-government initiative implementation in Thailand. Finally, this study is expected to provide greater understanding of information technology acceptance in a public organization in Thailand. The use of TAM will also offer a better understanding of user's perception; both perceived ease of use and perceived usefulness, which will help to enhance information technology use in the organization. Eventually, this will provide helpful guidelines for achieving the e-government initiative implementation in all public organizations as well as in Thailand.

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