แบบจำลองการยอมรับเทคโนโลยีในอุตสาหกรรมการบริการ

Technology Acceptance Model (TAM) in the Service Industries

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บทคัดย่อ

แบบจำลองการยอมรับเทคโนโลยี (Technology Acceptance Model, TAM) เป็นประโยชน์ต่อการคาดการณ์ความตั้งใจ (Intention) การรับรู้ (Perception) และทัศนคติ (Attitude) ของผู้ใช้เทคโนโลยี ซึ่งมีผลโดยตรงต่อพฤติกรรมการทำงานโดยรวม แบบจำลองนี้จึงเป็นเครื่องมือที่ทรงพลังสำหรับการปรับปรุงสมรรถภาพ (Performance) ขององค์กร โดยเฉพาะอย่างยิ่งในอุตสาหกรรมการบริการ (Service Industry) ซึ่งกำลังได้รับความสนใจมากขึ้นทุกขณะ งานวิจัยเชิงเอกสารนี้ ได้สำรวจการประยุกต์ใช้แบบจำลองการยอมรับเทคโนโลยีต่ออุตสาหกรรมการบริการที่หลากหลายในระดับนานาชาติ และในบางกรณีแบบจำลองที่ปรับปรุงให้สอดคล้องกับสถานการณ์ (Modified TAM) และ/หรือแบบจำลองเชิงวิจัย (Research Model) ยังถูกเสนออีกด้วย

Abstract

Technology Acceptance Model (TAM) is useful in predicting technology users' intention to use, perception and attitude, which directly influence overall work behavior. TAM is therefore a powerful tool for improving organizational performance, especially that in service industries which is gaining more attention recently. This documentary research explores the application of TAM in various service industries globally. In some cases, modified TAM and/or research models are proposed.

คำสำคัญ : แบบจำลองการยอมรับเทคโนโลยี (TAM), อุตสาหกรรมการบริการ, เทคโนโลยีสารสนเทศ

Key Words : Technology Acceptance Model (TAM), Service Industry, Information Technology (IT)

Introduction

Currently, Information Technologies (ITs) are rapidly replacing old manual applications by providing more powerful tools and higher speeds for users. However, the IT adoption can only be effective when users fully accept and use technology. It is therefore imperative for an organization to realize the importance of the acceptance process in IT application processes. There are three leading theories that explain the acceptance processes, namely, the Theory of Reasoned Action (TRA), the innovation diffusion theory (IDT), and the Technology Acceptance Model (TAM) (Venkatesh and Brown, 2001). The main concept of TRA is that an individual's actions are determined by his/her behavioral intention, which is influenced by attitude and the subjective norm. While attitude is primarily influenced by the factors of belief and evaluation, the subjective norm is affected by norm belief and the motivation to comply (Fishbein and Ajzen, 1975). The Theory of Planned Behavior (TPB) is an extension model of TRA which states that a person's actions are influenced by both interior and exterior control factors. The TPB includes the primary factor of perceived behavioral control in the theory. The IDT suggests that a user's perception of characteristics of an innovation affect technology adoption (Moore and Benbasat, 1991). Among these acceptance theories, TAM has received more attention (Plouffe et al., 2001).

The Technology Acceptance Model (TAM) was introduced by Davis (1989) to determine users' intention to use technology. Perceived usefulness and perceived ease of use are the two important beliefs that influence the usage of information systems. Davis (1989, 320) focused on the affective aspect of attitude and defined perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance" and perceived ease of use as "the degree to which a person believes that using a particular system would be free of effort." Perceived usefulness and perceived ease of use are independent variables, whereas dependent variables in Davis (1989)'s study are user's attitudes, intentions, and computer usage behavior. While perceived usefulness relates to job effectiveness, productivity, time saving and the relative importance of the system to one's job, perceived ease of use is associated with physical and mental effort as well as ease of

learning. In recent years, TAM has been widely used by information system researchers to gain a better understanding of the adoption and the use of information systems (Straub et al., 1997). Likewise, Yang and Yoo (2004) posited that TAM has emerged as a powerful tool to be used to predict potential information system usage by measuring users' belief after exposure to the system even for a short period of time through training, prototype or mock-up models.

As one of the most influential research models in explaining IT usage or acceptance behavior in various contexts, TAM is widely regarded as a relatively robust theoretical model for explaining IT use (Bruner and Kumar, 2005). From a practitioner point of view, TAM is useful for predicting whether users will adopt new IT (Straub et al., 1997). Information systems researchers have examined and replicated the construct of perceived usefulness and the construct of perceived ease of use and agreed that they are valid in predicting a person's acceptance of various corporate ITs (Doll et al., 1998). Many studies have replicated the original TAM and suggested that it may hold across technologies, persons, settings, and times (Straub et al., 1997). Table 1 shows samples of empirical studies testing TAM.

Table 1: A Sampling of Empirical Studies Testing TAM

Study	Type of study	Type of IS
Davis (11)	Lab experiment	E-mail and graphics software
Davis, Bagozzi and Warshaw (12)	Field study	Word processing and text editor
Mathieson (24)	Lab experiment	Spreadsheet software
Thompson et al. (39)	Field study	PCs
Adam et al. (1)	Field study	E-mail, Voice-mail, word processing, spreadsheet and graphics software
Szajna et al. (34)	Lab experiment	Database package
Keil, Beranek, and Konsynski (20)	Field study	Expert support system
Straub, Limayem and Karrahanna (36)	Field study	Voice-mail

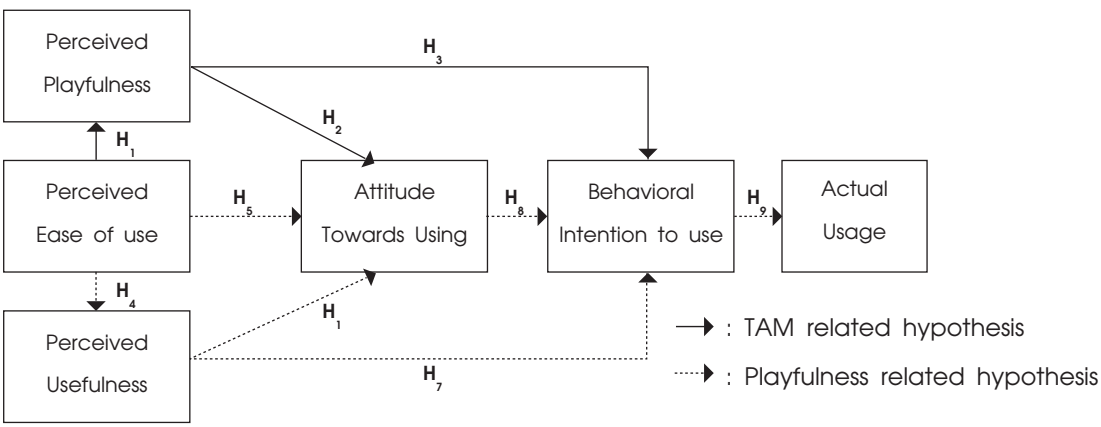
Source: Straub D. et al. (1997:2)

TAM has been applied in numerous samples of users and a wide range of information technologies. The model has been thoroughly verified in a spectrum of applications such as computers, business process applications, communications, and system software (Aggelidis and Chatzoglou, 2009). The following are some studies related to TAM, specifically in service industries.

TAM in Service Industries

Moon and Kim (2001) expanded TAM to explain the user's behavior toward newly emerging information technologies such as World-Wide-Web (WWW). Future technology acceptance research was used to investigate how other variables affect usefulness, ease of use, and user acceptance in different settings of technology, target users and context. In this study, they tested playfulness as a new intrinsic motivation factor that reflects the user's belief in WWW acceptance. The research model is shown in Figure 1. The results showed that perceived ease of use and perceived usefulness were significant to user's perception of WWW environment. Additionally, the results of the study demonstrated the importance of playfulness as an additional factor to the original TAM in this special setting, thus playfulness may also be an important consideration in the design of future WWW systems, especially in the areas of concentration, curiosity, and enjoyment.

Figure 1: Technology Acceptance Research model

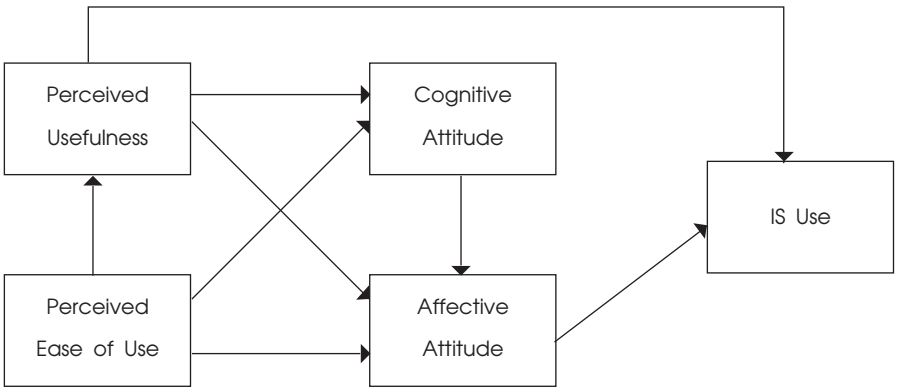


Source: Moon and Kim (2001:220)

Aggelidis and Chatzoglou (2009) investigated a Greek hospital personnel's willingness to use IT while performing their tasks to develop and test the modified technology acceptance model. The results indicated that perceived usefulness, ease of use, social influence, attitude, facilitating conditions and self-efficacy significantly affected the behavioral intention, thus the extended TAM model was applicable to this setting. They suggested that health organizations should first create a favorable environment or facilitating conditions which will support and encourage the use of IT, as well as emphasize on training that helps users to increase IT related knowledge.

Yang and Yoo (2004) extended the TAM by considering both affective and the cognitive dimensions of attitude, the two separate socio-psychological constructs, for information systems use. They found that attitude is an important variable to consider in explaining information system usage behaviors and deserves more attention in information systems research for its significant influence on the individual and organizational usage of information systems. The revised TAM with separate affective and cognitive attitudes is shown in Figure 2.

Figure 2: Revised TAM with Separate Affective and Cognitive



Source: Yang and Yoo (2004:22)

Straub et al. (1997) tested TAM across cultures in a three-country study. The study extended beyond the boundaries of North America to cover an application of E-mail by airline employees in Switzerland and Japan, representative samples from the continents of Europe and Asia. The ongoing rapid globalization of business and IT systems required the need to learn how far TAM applies in other cultures around the world because cultural differences may affect organization's ability to adopt and utilize ITs. This study is based on Hofstede (1980)'s cultural dimensions and their impact on technology acceptance which include the effects of uncertainty avoidance, power distance, individualism, assertiveness on the intention to use ITs. Table 2 lists the findings of the study. It was found that TAM is generally validated, except for Japan where TAM did not fit the data sample.

Table 2: Summary of Prediction

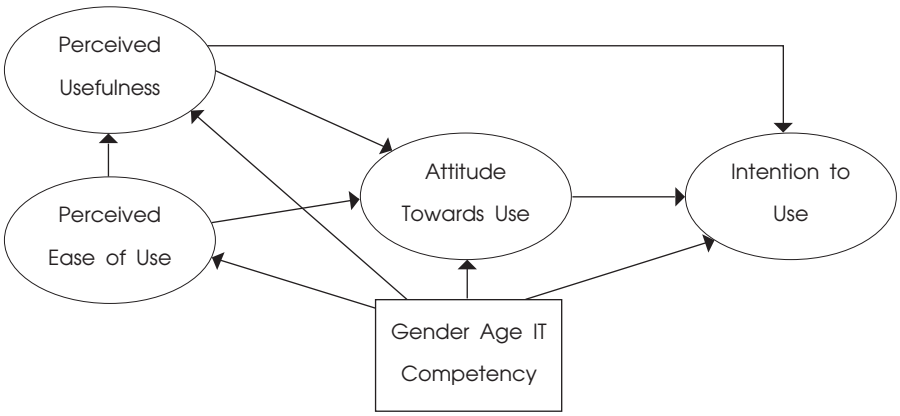
Culture	#	Hypothesis
U.S.A	H1a	TAM will fit the U.S. data sample
	H1b	The overall U.S. TAM model will not differ
	H1c	statistically from the overall Swiss TAM model
Switzerland	H2a	The overall U.S. TAM model will differ statistically
	H2b	from the overall Japanese TAM model
Japan	H3	TAM will fit the Swiss data sample
		The overall Swiss TAM model will differ statistically
		from the overall Japanese TAM model
		TAM will not fit the Japanese data sample

Source: Straub D. et al. (1997:6)

A study by Lai and Li (2005) empirically investigated TAM for its invariance across participant subgroups by applying different levels of invariance analysis on the TAM construct in the context of Internet banking acceptance. The theoretical validity and empirical validity of TAM is extended to include different technologies, users and organizational contexts, especially the e-banking system where the technology settings and transaction environments differ strongly from conventional environment. Shown in the research

model in Figure 3, TAM was applied to examine the effects of age, gender and IT competency. It was found that the TAM construct was invariant for samples across different genders, ages, and IT competent subgroups, thus suggesting that male and female, old and young, IT experts and novices, conceptualized the TAM construct in very similar ways.

Figure 3: TAM Research Model

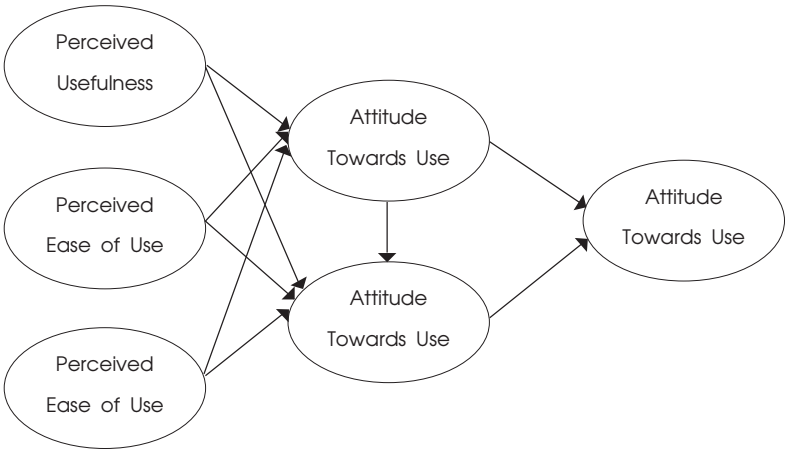


Source: Lai and Li, (2005:375)

Ham et al. (2008) investigated the factors affecting restaurant employees' intention to use technology. The research sample in this particular case was involved with restaurants listed in the Kentucky Restaurant Association. In addition to perceived ease of use and perceived usefulness, additional proposed constructs included user characteristics, systems quality and organizational support. A suggested research model is illustrated in Figure 4. The Structural Equation Modeling (SEM) statistics supported all of the proposed hypotheses but one. All external variables produced positive and significant impacts on perceived ease of use and perceived usefulness. However, the relationship about ease of use and intention to use was not supported.

This may be explained by the fact that the most recent point-of-scale systems are touch-screen and already easy to use for the employees. Additionally, employees are capable of using easy systems without intensive training unlike the past. Therefore, the perceived ease of use had no significant impact on the intention to use technology.

Figure 4: Suggested Research Model



Source: Ham, S.; Kim, W.G. and Fursyihe, H.W. (2008:442).

Kim et al. (2008) extended TAM to empirically examine the acceptance behavior of hotel front office systems employees. This study attempted to investigate the relationship between antecedents including information system quality, perceived value, and users' acceptance of hotel front office systems by adopting an extended TAM. Variables investigated included information system quality, perceived value, perceived usefulness, perceived ease of use, attitudes towards use, and actual use. Empirical results indicated the significance of all but the first two new variables. The study was able to find the acceptance of hotel front office systems from the perspective of hotel frontline employees through the external variables in order to enhance the model.

More recently, Kim et al. (2009) investigated the effects of ease of use, usefulness, and enjoyment, and subjective norm concerning the use of mobile phones on American consumers' attitudes toward mobile communication and mobile commerce, and mobile technology use intention for shopping. The findings illustrated that the perceived ease of use, usefulness, and enjoyment, and subjective norm were the important predictors of attitudes toward mobile communication and mobile commerce as well as mobile technology use intention for shopping. The results also suggested that attitude toward mobile communication positively influenced attitude toward mobile commerce, which in turn positively influenced mobile technology use for shopping.

In addition, Lin and Chou (2009) examined ways in which end-users perceived citation database interfaces, especially citation database interfaces' usability. The investigation used the TAM constructs of usefulness and ease of use to assess acceptance of citation database interfaces by university graduate students. A structural equation model was used to fit and validate the Citation Database Interface Acceptance Model (CDIAM). The findings showed causal relationships between the constructs considered by the CDIAM were well supported, accounting for 95 percent of total variance in citation database interface acceptance and usage. The study concluded that perceived usefulness, and not ease of use of citation database interface, is a key determinant of their acceptance and usage.

Finally, Aldas-Manzano and Sanz-Blas (2009) attempted to evaluate how personality variables related to technology (innovativeness, compatibility and affinity) could modify the influence of classical TAM variables on behavioral adoption intention of mobile shopping. The sample consisted of 470 Spanish mobile telephone users selected on the basis of convenience. The resulted showed that the effect of perceived usefulness and, in a minor degree, perceived ease of use were over dimensioned if personality variables were omitted making intention formation to be perceived as more rational than it really was. Personality variables (affinity to mobile telephones, compatibility and innovativeness) had a direct and positive influence on the intention to engage in M-shopping.

However, Dishaw and Strong (1999) argued that a weakness of TAM is the lack of task focus which can be solved by increasing its external validity through exploring the nature and specific influences of technological and usage-context factors that may change the user's acceptance.

Conclusion

Technology Acceptance Model states that perceived usefulness and perceived ease of use are the two important beliefs that influence the usage of information systems. A number of TAM applications in service industries, such as communications businesses, restaurants, hotels, internet banking and mobile shopping, are explored here. Investigations are done in many countries and some also proposed modified/revised version of TAM with

suggested research models. Modified models specific to businesses are the results of the difference in service nature. This paper calls for further investigation on TAM for particular service industries at different locations and types of business, especially those in Thailand.

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