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# RE-EXAMINING FACTORS INFLUENCING INFORMATION TECHNOLOGY ACCEPTANCE BY INDIVIDUAL PROFESSIONALS

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# RE-EXAMINING FACTORS INFLUENCING INFORMATION TECHNOLOGY ACCEPTANCE BY INDIVIDUAL PROFESSIONALS

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## Abstract

*This study proposed a comprehensive decomposed TPB model to understand the factors influencing the intentions of individual professionals to use information technology. A field survey was conducted to collect analysis data from physicians who have used Medline system, a kind of evidence-based medicine database, in Taiwan. After the research model was tested by the partial least square method with bootstrap estimate, we found that decomposed TPB provides effective prediction of physicians' acceptance intention of the Medline system. Comparing to subjective norm and perceived behavioral control, attitudes towards using the IS provide better predictive power for behavioral intention. In addition, perceived usefulness and perceived ease of use have significant impact on attitude, respectively. Perceived ease of use has significant impact on perceived usefulness. The variance of subjective norm can be effectively explained by interpersonal influence. Personal innovativeness in IT not only directly influences perceived behavioral control, but also indirectly influences perceived behavioral control through self-efficacy. However, the facilitating conditions have no significant effect on perceived behavioral control. These findings not only provide insights for further research related to information technology acceptance by individual professionals, but also offer medical institutions practical suggestions.*

*Keywords: decomposed TPB model, professional users, acceptance of information technology, evidence-based medicine*

# 1 INTRODUCTION

The adoption and use of Information system (IS) is a key factor of successfully implementing IS and have been an important issue in IS literature (Cooper and Zmud 1990; Markus and Keil 1994). Prior studies investigated IS adoption behavior based on different theories, including the “technology acceptance model” (TAM; Davis 1989), the “diffusion of innovations model” (Roger 1995), the “theory of reasoned action” (TRA; Fishbein and Ajzen 1975), and the “theory of planned behavior” (TPB; Ajzen 1985). However, prior IS adoption studies focused on adoption intention or adoption behavior of typical technology users (e.g. executives, managers, and end users), rare studies focused on adoption intention or behavior of individual professionals (e.g. physicians, lawyers, and accountants). The characteristics of individual professionals are different from typical technology users. For example, physicians work autonomously, and executives of hospital could not force physicians to adopt specific IS (Chau and Hu 2002a). Therefore, it is important to find a theoretical model that adequately examines the adoption behavior of individual professionals. Previous studies have tried to explain the factors that affect individual professionals’ adoption intention to IS (Chau and Hu 2001, 2002a, 2002b; Hu et al. 1999), but, to our best knowledge, there are no robust and consistent theories that can conclude it. The purpose of this study is to extend the understanding of the factors that affect individual professionals’ information technology acceptance by an empirical study of physicians’ acceptance behavior to evidence-based medicine (EBM).

IS has been adopted substantially to improve efficiency and effectiveness of work flow and enhance medical quality by hospitals (Menon et al. 2000). The target IS of this study is the Medline system - an online database that helps physicians searching and referring many rigor medical articles to improve diagnosis quality. Physicians often diagnose diseases based on personal experience or discussion with other physicians. However, since there are many uncertainty factors that may influence the medical quality, it is necessary to make clinical diagnosis based on reliable and objective clinical research results. The experiences of physicians are sometimes at odds with the latest (or best) medical evidences. Therefore, EBM has been a usefully clinical practice to improve the medical quality, and Medline system is one of useful IS that help physicians to implement EBM. Since physicians are professionals, and the Medline system is different from other information systems (e.g. telemedicine), investigating physicians’ adoption intention of the Medline system can reexamine explanatory power of IS acceptance model extended to individual professional. The empirical results of this study not only propose a comprehensive decomposed TPB model to predict physicians’ acceptance intention of IS, but also provide insights to understand IT adoption behavior of individual professional.

This paper is organized as follows. Section 2 summarized relative theories and intention model of adoption behavior. Then EBM and the target medical IS—Medline is discussed in section 3. Next we propose the research hypotheses and measures in section 4. After that, this study discusses the results of data analysis in section 5 and makes a brief conclusion in section 6.

## 2 LITERATURE REVIEW

The main issue of IT adoption research is to find out the key factors that influence IS users’ actual use behaviors. Since an individual’s actual behavior is directly affected by her/his intention to do the behavior (Fishbein and Ajzen 1975), intention models have been extensively adopted to predict actual behavior (Agarwal and Prasad 1999; Venkatesh and Morris 2000; Venkatesh, et al. 2003). Therefore, the question of how to predict user intention towards IS acceptance has been a popular research framework of IS adoption research (Taylor and Todd 1995a). Some widely adopted theories including TRA, TPB, decomposed TPB, and TAM, predict users’ behavior of using IS all based on intention model. TRA is skipped in following discussion, because TRA is a fundamental theory of TAM and TPB and the TPB contains the main constructs of TRA. This section compares decomposed TPB with

TAM and TPB to explain the reason why the decomposed TPB is advantageous to explain physicians' adoption intention of IS in this study.

## 2.1 Technology Acceptance Model

Davis (1989) proposed TAM to investigate the technology adoption behaviors, and found two constructs that influence a user's intention to use technology are *attitude toward use technology* and *perceived usefulness* (PU). Furthermore, users' attitudes toward use technology are influenced by PU and *perceived ease of use* (PEOU), and PU will be influenced by PEOU. Attitude is a user's positive or negative evaluation of using the technology. PU is defined as the perception of a user with regard to whether using a particular technology will increase job efficiency. On the other hand, PEOU is defined as the user's perception about how easy it is to use a specific technology (Davis 1989). The explanatory power of TAM has been validated by many empirical studies (Davis 1993; Davis et al. 1989; Mathieson 1991). However, contrary to typical technology users, TAM is not fully appropriate for examining technology acceptance by individual professionals (Hu et al. 1999).

## 2.2 Theory of Planned Behavior and Decomposed TPB model

In addition to TAM, TPB is another intention-behavior model that has been applied extensively to examining user acceptance of information technology. Derived from TRA, the main constructs of TPB are attitude, *subjective norm* (SN), and *perceived behavioral control* (PBC) (Ajzen 1985, 1991). In information adoption circumstances, 'attitude' conveys a user's positive or negative evaluation of using the technology. Subjective norms are determined by a user's perception of other relevant people's opinions concerning whether he/she should use the technology or not. PBC is determined by a user's perception of the ability (e.g. availability of skills, resources) to use the technology. Since a user does not always possess sufficient abilities or resources for utilizing a technology, the construct—PBC increases the explanatory power of behavior intention prediction. TPB postulates that behavioral intention is a weighted function of attitude, subjective norm, and perceived behavioral control. These three antecedent constructs are measured by different belief structures (Taylor and Todd 1995a).

Although prior studies found that TPB will predict behavior intentions better than TRA (Ajzen and Madden 1986; Taylor and Todd 1995b; Ryu et al. 2003), other research has found that TAM may be more appropriate than TPB for examining health care professionals' decisions to accept telemedicine technology (Chau and Hu 2002a). Therefore, whether TPB is an appropriate theory to predict individual professionals' adoption behavior of IS or not is undefined before the more empirical studies are conducted. Furthermore, combining multiple beliefs into a unidimensional construct in TPB may cause a consistent difficulty. Several studies argued that beliefs should be decomposed into multidimensional constructs (Bagozzi 1981, Shimp and Kavas 1984, Taylor and Todd 1995a). Since TPB appears to be a weaker theory than TAM in some circumstances and TAM ignores the effects of SN and PBC on behavior intention, this study investigates physicians' acceptance intention of the Medline system based on decomposed TPB model.

Decomposed TPB models may represent the relationships between multiple beliefs and three antecedents (i.e. attitude, SN, and PBC) of intention more clearly (Taylor and Todd 1995a). Some prior studies have found that decomposed TPB model has good explanatory power to predict technology acceptance by individual professionals (Chau and Hu 2001; Yi et al. 2006). As Table 1 shows, prior studies decomposed three antecedent constructs in TPB into different beliefs. Although crossover effect may exist among these beliefs, crossover effect is hard to explain and is rarely used in prior studies. Hence, this study suspends to investigate crossover effect.

Table 1 Review of prior studies relative to decomposed TPB model

| Prior studies                        | Decomposed belief structures are proposed   |   |   | Findings  |
|--------------------------------------|---|---|---|---|
|                                      | Attitudinal   | SN  | PBC   |   |
| Taylor and Todd (1995a)              | <ul style="list-style-type: none"> <li>● Perceived Usefulness<sup>Ψ</sup></li> <li>● Ease of Use</li> <li>● Compatibility</li> </ul>  | <ul style="list-style-type: none"> <li>● Peer Influence<sup>Ψ</sup></li> <li>● Superior's Influence<sup>Ψ</sup></li> </ul>  | <ul style="list-style-type: none"> <li>● Self Efficacy<sup>Ψ</sup></li> <li>● Resource Facilitating Conditions<sup>Ψ</sup></li> <li>● Technology Facilitating Conditions</li> </ul> | The results indicate that, compared with TAM and TPB, decomposing the belief structures in the TPB provided a moderate increase in the explanation of behavioral intention.   |
| Taylor and Todd (1995b) <sup>Φ</sup> | <ul style="list-style-type: none"> <li>● Relative Advantages<sup>Ψ</sup></li> <li>● Complexity<sup>Ψ</sup></li> <li>● Compatibility</li> <li>● Normative Influences<sup>Ψ</sup></li> <li>● Efficacy</li> <li>● Facilitating Conditions</li> </ul> | <ul style="list-style-type: none"> <li>● Relative Advantages</li> <li>● Complexity</li> <li>● Compatibility</li> <li>● Normative Influences<sup>Ψ</sup></li> <li>● Facilitating Conditions</li> </ul> | <ul style="list-style-type: none"> <li>● Complexity</li> <li>● Efficacy</li> <li>● Facilitating Conditions<sup>Ψ</sup></li> </ul>   | Decomposing the belief structures and allowing for crossover effects in the TPB resulted in improvements in model prediction.   |
| Chau and Hu (2001)*                  | <ul style="list-style-type: none"> <li>● Perceived Usefulness<sup>Ψ</sup></li> <li>● Perceived Ease of Use</li> </ul>   | N/A   | N/A   | TAM has better explanatory power than TPB to predict technology acceptance by individual professionals, but the decomposed TPB is better than TAM slightly.   |
| Chau and Hu (2002a)                  | <ul style="list-style-type: none"> <li>● Perceived Usefulness<sup>Ψ</sup></li> <li>● Perceived Ease of Use</li> </ul>   | N/A   | N/A   | TAM is more appropriate than TPB for examining technology acceptance by individual professionals and that the decomposed model.   |
| Chau and Hu (2002b) <sup>Φ **</sup>  | <ul style="list-style-type: none"> <li>● Perceived Usefulness<sup>Ψ</sup></li> <li>● Perceived Ease of Use</li> <li>● Peer Influence</li> </ul>   | Subjective norm was not included in this study.   | <ul style="list-style-type: none"> <li>● Perceived Ease of Use<sup>Ψ</sup></li> </ul> (Perceived technology control is being substituted for PBC in this study)                     | Results of the study show that perceived usefulness determines physicians' attitude and behavioral intention of telemedicine technology and perceived ease of use influences the physicians' perceived technology control of telemedicine technology. |

Notes:<sup>Φ</sup> hypothesized crossover effects

\* Compatibility influences perceived usefulness<sup>Ψ</sup> and perceived ease of use. Perceived ease of use influences perceived usefulness. Perceived usefulness influences behavioral intention<sup>Ψ</sup>.

\*\* Compatibility influences perceived usefulness<sup>Ψ</sup>, perceived ease of use, and behavioral intention. Perceived ease of use influences perceived usefulness. Perceived usefulness influences behavioral intention<sup>Ψ</sup>. Peer influence influences behavioral intention.

<sup>Ψ</sup> The result of statistical test is significant.

### 3 EBM AND MEDLINE SYSTEM

EBM is a scientific methodology which employs the technique of mining reliable information from huge medical databases using epidemiological or statistical methods. The purpose of using EBM is to improve the care delivered to patients (Steves and Hootman 2004). EBM has been defined as "Evidence based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from

*systematic research* (Sackett et al. 1996).” or “*Evidence based medicine is the process of systematically finding, appraising, and using contemporaneous research findings as the basis for clinical decisions* (Rosenberg and Donald 1995).” EBM has become a major driving force for many hospital or healthcare organizations.

The traditional channels that physicians use to collect external clinical evidence to perform EBM are textbooks, medical magazines, colleagues, and other literature. These channels have two shortcomings. First, periodic medicine publications are laggardly updated, so it is hard to find the latest clinical reports or scientific literatures. Second, manual search is an inefficient approach that limits physicians’ performance. However, with the development of the Internet, these shortcomings are overcome by online medicine database systems. For example, Evidence Based Medicine Reviews (EBMR) is a kind of medicine reviews database which contains several online databases, including ACP Journal Club, Evidence-Based Medicine, Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effectiveness, and Cochrane Central Register of Controlled Trials. Physicians not only use online medicine database systems to search medical knowledge easily and efficiently, but in order to obtain data regardless of the time or place (Hjelm and Tong 1998).

In addition to EBMR, there are many popular medicine database systems, including Medline, PubMed, and Cochrane Library. Medline is the largest biomedical research literature database, which gathers over 4,800 kinds of famous science authoritative journals all over the world. There are about 12 million records at present in the database and increasing about 15,000 to 20,000 records every month. In the Medline, 75% are English literature and 25% are non-English literature. The subjects include bioscience, anatomy, organisms, physical sciences, chemicals and drugs, and so on. The Medline can also interconnect with the PubMed and Cochrane Library. Medline can help the clinicians and researchers search required medical literature more efficiently and effectively.

## **4 RESEARCH HYPOTHESES, DESIGN, AND METHOD**

### **4.1 Research hypotheses**

This study adopts a decomposed TBP model as a research framework to investigate the use of the Medline system by physicians in Taiwan in order to extend the understanding of individual professionals’ behavioral intention towards using IS. The three antecedent constructs that directly affect behavior intention in TPB model (i.e. attitude, SN, and PBC) are decomposed into multidimensional constructs and 11 hypotheses are proposed based on TPB model and related literatures. In terms of Medline acceptance, attitudes are referred to as a physician’s positive or negative evaluation about using the Medline system. Since EBM has become one of the major driving forces in clinical treatments, physicians use Medline to perform EBM and develop their attitudes toward using Medline (abbreviated to ATTI in later research model) through continuous search and practical performance. Hence, according to TPB we hypothesize:

*H1: The attitudes of physicians toward using a particular information system will positively affect their behavioral intention to use the system.*

Attitude was decomposed into multidimensional constructs, as listed in Table 1, to predict behavioral intention towards information technology usage in prior research. The reasons why this study decomposed attitude into PU and PEOU are as follows. First, the impact of PEOU on PU and attitude in information system acceptance intention has been validated by the technology acceptance model (TAM) and many prior research (Davis 1989; Davis et al. 1989; Venkatesh et al. 2003). Second, PEOU has significantly direct effect on PU while physicians are using PDA (Yi et al. 2006). Therefore, this study reexamines the effect of PEOU on attitude and decomposed attitude into PU and PEOU to obtain solid validity. Hypotheses H2-H4 are proposed here:

*H2: The perceived level of usefulness of a particular information system by physicians will positively affect their attitudes toward using the system.*

*H3: The perceived level of ease of using a particular information system by physicians will positively affect their attitudes toward using the system.*

*H4: The perceived level of ease of using a particular information system by physicians will positively affect their perceived level of usefulness of the system.*

An individual's behavioral intention towards IS will also be influenced by subjective norms, which are a kind of subjective social pressure derived from cohesive people (e.g. relations, colleague, or peers) (Fishbein and Ajzen 1975, Taylor and Todd 1995a). Since subjective norms can predict resident and faculty physicians' behavioral intention significantly (Yi et al. 2006), we argued that a physician may adopt Medline due to the policy of institution, superiors' anticipation, or colleagues' identification. Therefore, the hypothesis 5 was hypothesized as following:

*H5: The perceived level of subjective norm by physicians with regard to using a particular information system will positively affect their behavioral intention to use the system.*

Bhattacharjee (2000) adopted a decomposed TPB to examine individual intentions concerning e-commerce service acceptance and found that both external (mass-media) and interpersonal influences effectively explained the perceived level of subjective norm. Furthermore, Taylor and Todd (1995a) found that the influence of both peers and superiors have a direct effect on subjective norms. As a result of an individual's perceived level of subjective norms is affected by his/her significant referents' expectation (Burnkrant and Page 1988), we proposed that physicians' perceived level of subjective norm will be influenced by their peers, experts, and coherent colleagues. Nevertheless, physicians are professionals, and are affected less strongly by external influences. Therefore, this study predicted subjective norm by a single interpersonal influence construct. It means that the expected influence of the peers and experts are expected to be highly correlated with the subjective norm. Therefore, this study decomposed normative beliefs as unidimensional construct—interpersonal influence and hypothesized:

*H6: The perceived level of interpersonal influence of physicians will positively affect their perceived level of subjective norms with regard to using a particular information system.*

In addition to the effect of attitudes and subjective norms, behavioral intention is influenced by perceived behavioral control (PBC), which refers to an individual's perceptions of the presence or absence of requisite resources and self-ability needed to perform the behavior (Ajzen 1991; Chau and Hu 2002a). An individual who has plentiful resources in order to perform a behavior will have a higher perception of PBC that positively influences behavioral intention. Therefore a physician will have higher intention toward using Medline system while he/she has adequate resources to use Medline system. Accordingly, we hypothesized H7 here:

*H7: The perceived level of behavioral control of physicians will positively affect their behavioral intention to use a particular information system.*

PBC is another construct that has a direct impact on behavioral intentions in the TPB model. Prior research found that the self efficacy and resource facilitating conditions of users have a direct effect on PBC; while technology facilitating conditions have no impact (Taylor and Todd 1995a). Self-efficacy is defined as an individual's self-confidence in skills or ability to perform the intended behavior and facilitating conditions is defined as the beliefs about availability of resources to facilitate that behavior (Bhattacharjee 2000, p. 413). Since the target system of this study is the Medline system which is a kind of web-based system, the infrastructure requirements just include personal computer and Internet connection. The technology facilitating conditions is not an import factor that may influences users' belief of PBC. Therefore, PBC is decomposed into self-efficacy (SEC) and resource facilitating conditions (FC) in this study. Hypothesis 8 and Hypothesis 9 are here.

*H8: The perceived level of resource facilitating conditions by physicians will positively affect their perceived level of PBC of using a particular information system.*

*H9: The perceived level of self-efficacy by physicians will positively affect their perceived level of PBC of using a particular information system.*

In addition to self-efficacy and facilitating conditions, this study proposes that personal innovativeness in IT (PIIT) will be an antecedent variable of PBC. Agarwal and Prasad (1998) defined PIIT as “*the willingness of an individual to try out any new information technology* (p.206).” Although some prior studies argued that PIIT is a variable antecedent to attitude, the results of these studies are not significant (Hung et al. 2006, Lian and Lin 2008, Taylor 2007). On the other hand, Yi et al. (2006) found that PIIT will have a positive effect on PBC in the context of PDA acceptance by health care professionals. An individual who has high levels of PIIT will result in more instances of technology use and experimentation. Thus an individual’s PIIT will influence his/her self-efficacy beliefs (Agarwal et al. 2000). Since the purpose of this study is to understand information system acceptance by individual professionals, we add this construct to examine the explanatory power of PBC and validate the association relationship among PIIT, self-efficacy, and PBC. Therefore, we hypothesized:

*H10: The PIIT level of physicians will positively affect their perceived level of PBC of using a particular information system.*

*H11: The PIIT level of physicians will positively affect their perceived level of self-efficacy beliefs.*

## **4.2 Measures**

This study decomposed the belief structures in the TPB to predict individual professionals' usage intention. Attitude is decomposed into PU and PEOU; Subjective norm is predicted by interpersonal influence; PBC is decomposed into PIIT, self-efficacy, and facilitating conditions. All measures of each construct were cited from relevant prior studies and were measured using a seven-point Likert scale with anchors on strongly agree and strongly disagree, respectively. In order to validate the content validity of questionnaires, pretests were conducted by asking several physicians and information management professors to evaluate the instruments. Some ambiguous or unclear words were modified to enhance the instrument’s content validity.

## **4.3 Sampling procedure**

This study conducted a field survey to collect data. The target subjects were physicians who have used the Medline system in Taiwan. Since the resources necessary to use the Medline system are different among all hospitals, all medical institutions are classified into three categories (medical center, regional hospital and local hospital) and four locations (north, central, south, and east ) in order to conduct a quota sampling. Before sending out the questionnaires, we successfully contacted 15 medical institutions to collaborate. One survey administrator was assigned by each collaborative institution to help us complete survey procedures. 455 questionnaires were sent in through each survey administrator in total and 266 questionnaires were returned. Finally, 224 questionnaires were used to analyze after discarding 42 incomplete questionnaires except for their demographic items. The effective responses rate is 49.23%. 17.86% of the respondents were female and 82.14% were male. Half respondents were attending physician except one missing value. The majority of them had age between 31 to 40 years old and had over 3 years of clinical experience.

## **5 DATA ANALYSIS AND DISCUSSION**

Structural equation modeling using the partial least square (PLS) method with bootstrap estimate was used for data analysis, because PLS makes minimal demands in terms of sample size and residual distribution while validating a model (Chin 2003). In addition to content validity which was evaluated



before sending questionnaires, the validity of multiple-item constructs in this study was assessed in terms of convergent validity and discriminant validity. The convergent validity of each dimension was assessed based on the factor loading of each item, composite reliability, and the average variance extracted (Fornell and Larcker 1981; Hair et al. 1998). The first test was performed using confirmatory factor analysis. A majority of the items loaded on the correct latent constructs, with the exception of FC-3 (the item 3 related to facilitating conditions). The item FC-3 was withdrawn from subsequent analysis since its factor loading is lower than 0.4. In addition, the composite reliabilities of each main construct exceeded the criterion of 0.70 (Nunnally 1978). All average variances extracted (AVE) for these constructs exceeded the criterion of 0.5 (Hair et al. 1998), and the square root of all AVEs exceeds all other cross correlations. Therefore, the findings indicate adequate convergent validity and discriminant validity.

The standardized PLS path coefficients and explained variances for the research model are shown in Figure 1. The statistical results demonstrate that all path coefficients are positive and significant except the path from FC to PBC. The results indicate that all hypotheses are significantly supported except the hypothesis 8. The explanatory power of each principal construct in TPB is higher than 0.45 including behavioral intention ( $R^2=0.518$ ), attitude ( $R^2=0.494$ ), subjective norm ( $R^2=0.520$ ), and perceived behavioral control ( $R^2=0.458$ ). The explanatory power of behavioral intention in this study is higher than some prior research whose research empirically examined the acceptance of telemedicine technology by physicians in Hong Kong (Chau and Hu 2001, 2002a, 2002b), but is lower than Yi et al. (2006) whose research developed an unified model to understand information technology acceptance by physicians. It means that decomposed TPB could effectively explain physicians' acceptance of information systems, but there are other antecedent factors that were not included in this model. Furthermore, perceived ease of use and PIIT explained 23.9% and 12.3% of the variance in perceived usefulness and self-efficacy respectively. It implies that the main beliefs of each principal construct of TPB may be influenced by other beliefs.

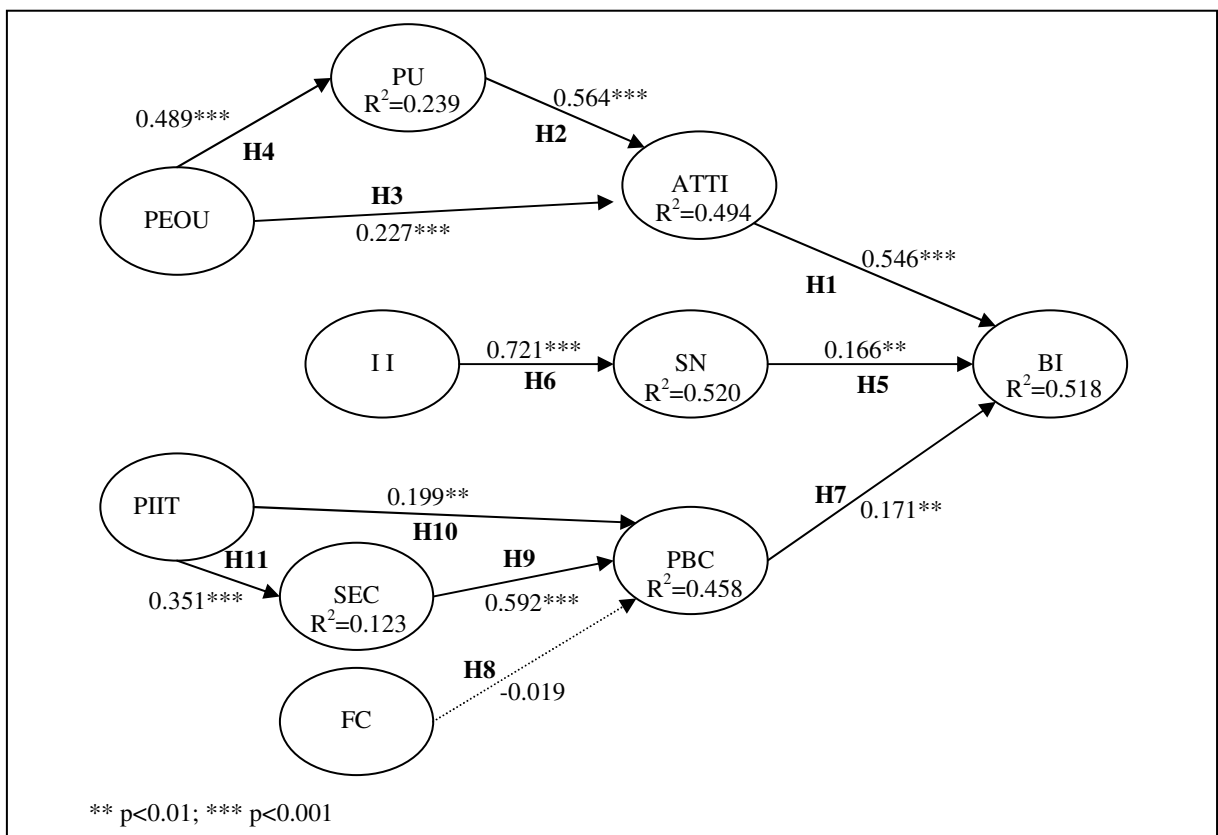


Figure 1 Research framework and the results of PLS analysis

Hypothesis 1 asserted that physicians' attitudes toward using online medical database systems will positively affect their behavioral intention to use the system. The results of PLS analysis show that H1 was significantly supported. The path coefficient was 0.546 that is substantially higher than both path coefficients of path from subjective norm to behavioral intention and path from perceived behavioral control to behavior intention. It implies that physicians' intention of accepting the information systems was directly influenced by their attitudes toward using the system. Moreover, attitude was significantly influence by perceived usefulness (H2 was significantly supported;  $r = 0.564$ ,  $t = 7.57$ ). However, attitude and perceived usefulness were significantly influenced by perceived ease of use (H3 was significantly supported;  $r = 0.227$ ,  $t = 3.81$ ; H4 was significantly supported;  $r = 0.489$ ,  $t = 8.38$ ). This finding is consistent with technology acceptance model (Davis 1989) while that is inconsistent with the results of some prior studies (e.g. Chau and Hu 1999, 2002a, 2002b). It is a very interesting issue that whether perceived ease of use will directly influence attitude or indirectly influence attitude through perceived usefulness in the context of information technology acceptance by individual professionals. Chou and Hu (2002a) argued that, compared with the typical technology users, physicians have relatively high general competence and cognitive capacity and relatively strong staff support for operating related technologies. Physicians may learn technology quickly – this may lead to overlooking the ease-of-use factor. However, we argued that even though physicians have high general competence and cognitive capacity, friendly and easy design is indispensable to an information technology user. Especially an individual professional is so busy that he/she has no time to lean information technology by try and error. Therefore, we proposed an explanation of the inconsistent results between our research and prior studies is the operating context. As Chou and Hu (2002a) argued, physicians have relatively strong staff support for operating telemedicine technology. However, physicians often search literatures in the Medline system by themselves. In other words, when professionals have to operate information technologies by themselves, as the typical technology users, perceived ease of use will influence their perceived level of usefulness of the information technology and their attitudes toward using the information technology.

Hypothesis 5 states that the perceived level of SN by physicians with regard to using a particular information systems will positively affect their behavioral intention to use the system. The results of PLS analysis show that H5 was significantly supported. The path coefficient was 0.166, indicating that subjective norms have significant influence on behavioral intention but not to an extent comparable to attitude. It implies that physicians' acceptance intention of the information system also was influenced directly by their perceived level of subjective norms. In addition, subjective norms was significantly influenced by interpersonal influence (H6 was significantly supported;  $r = 0.721$ ,  $t = 19.33$ ). This finding is not only consistent with research result of Taylor and Todd (1995a) whose research decomposed subjective norm into peer influence and superior's influence, but also is consistent with research results of Bhattacharjee (2000) whose research decomposed subjective norm into interpersonal influence and external influence. However, as our best knowledge, using interpersonal influence to predict individual professionals' perceived level of subjective norms related to acceptance information technology has not been explored in prior studies. This finding will provide significantly insights for further related research. On the other hand, the explanatory power of subjective norm is  $R^2 = 51.95\%$ . It means that the most variance in subjective norm may be explained by interpersonal influence. Since we argued that individual professionals' perception will not be influence by external influence, external influence has not been included in this study. However, some antecedent briefs should be included to substitute uni-dimensional decomposition and enhance the explanatory power of subjective norms in future studies.

As stated in hypothesis 7: *The perceived level of behavioral control of physicians will positively affect their behavioral intention to use a particular information system.* The results of PLS analysis in Figure 1 show that coefficient of path from perceived behavioral control to behavioral intention is 0.171 significantly even though the influence is not to an extent comparable to attitude. As the research results of Chau and Hu (2002a, 2002b) and Yi et al. (2006), physicians' perceived behavioral control will positively influence their usage intention of information technologies. It implies that physicians

will have a high intention of using an information system when they perceived they can use or control the information system effectively.

In order to understand the principal beliefs of perceived behavioral control, this study further investigated the associations among perceived behavioral control, PIIT, self-efficacy and facilitating conditions. Nevertheless, hypothesis 8 is not significantly supported beyond our expectation. It is surprising that facilitating conditions has no significant influence on perceived behavioral control. This is inconsistent with the results of some prior studies (Bhattacharjee 2000; Taylor and Todd 1995a). We propose two reasons why we have inconsistent results with prior studies. First, it may express fundamental differences between physicians and the typical technology users. Physicians are professionals who have relatively strong staff support and good information infrastructures or facilities, so facilitating conditions are not their concern. Second, the necessary resources of the Medline system include the personal computer with software and Internet. Since these requirements are essential resources of medical institutes, facilitating conditions are not key factors of usage behavior of the Medline system.

In addition, self-efficacy will directly influence perceived behavioral control (H9 is significantly supported;  $r = 0.592$ ,  $t = 9.71$ ); PIIT will directly influence perceived behavioral control (H10 is significantly supported;  $r = 0.199$ ,  $t = 3.07$ ) and indirectly influence perceived behavioral control through self-efficacy (H11 is significantly supported;  $r = 0.351$ ,  $t = 6.00$ ). As same as our inferences, physicians' self-efficacy positively influence physicians' perceived behavioral control. On the other hand, physicians' personal innovativeness in IT not only influences perceived behavioral control, but also influences self-efficacy. Although Yi et al. (2006) found that personal innovativeness in IT has crossover effect on perceived ease of use, subjective norm and perceived behavioral control in their research. In this study, we didn't adopt crossover procedure due to that cross effect has no robust validation in prior studies. It is necessary to carefully examine the conditions under which crossover effects will occur (Taylor and Todd 1995b). Therefore, we focus the effect of PIIT on perceived behavioral control and self-efficacy. The results show that PIIT provides predictive power for self-efficacy ( $R^2 = 0.123$ ) and the variance of perceived behavioral control could be mainly explained by PIIT and self-efficacy ( $R^2 = 0.458$ ). It implies that individual professionals' personal characteristics may influence their perceived level of behavioral control.

## 6 CONCLUSIONS

This study adopted a comprehensive decomposed TPB model to understand the factors influencing physicians' intention to use evidence-based medicine (EBM) database—Medline system. A field survey was conducted and the questionnaires were spread among 455 physicians who have used evidence-based medicine and worked over three level medical institutes in Taiwan. Finally, 224 responses were adopted to test our research model by the partial least square method with bootstrap estimate. The results showed that decomposed TPB provides effective predictive power for physicians' acceptance intention of the Medline system. These findings not only provide insights for further research related to information technology acceptance by individual professionals, but also offer medical institutions practical suggestions.

### 6.1 Implications for Research

This study found that decomposed TPB provides a powerful explanation of individual professionals' intentions of using information systems, because the r-square of behavior intention is 0.518, which is higher than prior studies that adopted other intention models to predict physicians' behavior intention for information technology (Hu et al. 1999; Chau and Hu 2002). It implies that decomposed TPB could be a robust research model to predict individual professionals' behavior intention for information systems. Although subjective norms and perceived behavior control will influence

behavior intention as attitude, physicians' attitudes toward using the IS provides better predictive power for behavioral intention.

In addition, findings of this study also points out those antecedent factors influencing individual professionals' adoption and usage. For example, perceived usefulness and perceived ease of use have significant impact on attitude and perceived ease of use have significant impact on perceived usefulness. The variance of subjective norms can be effectively explained by interpersonal influence. Personal innovativeness in IT not only directly influences perceived behavioral control, but also indirectly influences perceived behavioral control through self-efficacy. Through the decomposed approach, our model becomes more managerially relevant. In other words, decomposed TPB can provide more concrete insight into what specific factors that can be managed or controlled to enhance individual professionals' intention to adopt information systems.

The facilitating conditions have no significant effect on perceived behavioral control in this study. We argued that since information infrastructure is available to most organizations, the influence of the facilitating conditions on perceived behavior control will decrease gradually. Since individual professionals have better facilitating conditions than traditional end users, this factor could be ignored in future research.

## **6.2 Implications for Management Practice**

The findings of this study can also provide useful recommendations to medical practitioners and suppliers of information systems in order to enhance physicians' intention to use EBM database. Enhancing physicians' positive attitudes toward using EBM databases is the first important issue. Since physicians' perceived level of usefulness of IS and perceived level of ease of using IS will positively affect their attitude toward using the system, suppliers of information systems should design information systems in more user-friendly ways. If we can help physicians use EBM database effortlessly, they will find that EMB database can help them improve the care delivered to patients and perceive usefulness of EBM database. Then physicians will form positive attitude toward using EBM database, enhance intention to use EBM database, and adopt EBM database.

Second, our research has shown that subjective norm contribute to physicians' intention to use EBM database and the antecedent factor is interpersonal influence. Physicians are likely to develop independent evaluations, but they also take account of others' opinions even though the influence is not strong as attitude. For that reason, managers of medical institutions can exploit the influence by peers to enhance physicians' intention to use EBM database. For example, they can found an association to promote EBM and provide a mechanism to share experience of using EBM database.

Third, perceived behavioral control has significant influence on behavioral intention. Physicians are professionals, but they are not always familiar with information systems. Although nurses and technologists will support physicians to operate EBM databases, our research found that if physicians perceive that they have ability to use the EBM database, they will have higher intention to use EBM database. Hence, training physicians how to operate EBM database by themselves will directly enhance PBC and indirectly enhance BI. The physicians who lack personal innovativeness in IT are in need of special support.

Finally we argued that not only the EBM database, but also other information systems could be adopted by individual professionals via the approaches mentioned above. That is to say, the proposed decomposed model of this study provides a vigorous framework to explain and predict individual professionals' intention to use information systems. On the other hand, the factors that have been identified as important here should be manipulated while we are implementing information systems for individual professionals.

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