

# THE ROLE OF USER-TECHNOLOGY FIT ON USER EVALUATIONS OF INFORMATION SYSTEMS

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## Abstract

*Information technology (IT) has evolved step by step; is the crystallized wisdom of man. Technologies are viewed as tools for carrying out an individual's tasks (Goodhue & Thompson, 1995), in the meantime, the necessity for IT has been produced by people's requirements and it has become an essential tool in the work place. Customized technological tools are prerequisites to the successful execution of a job. Nevertheless, the success of a task still depends on those who employ these eminent tools.*

*The notion of user-technology fit (UTF) has originated/arisen from an overlooked linkage in the tripartite nature of the task-technology fit (TTF). User-technology fit is an important construct that was only implicit in past research and so was almost disregarded. Based on the equitable need theory (Au et al., 2008) and self-efficacy (Bandura, 1986), a measure for UTF was developed. This construct was composed of personal motivation and capabilities. In addition, this study has also tried to grasp why and how UTF can affect an individual's performance. Finally/So, an empirical study was conducted to examine users' evaluation of information systems. The analytical results have indicated that UTF is a second order construct. Furthermore, by integrating UTF and TTF rather than using only TTF a better explanatory power has been provided on users' evaluations.*

*Keywords: User-Technology Fit, Task-Technology Fit, Equitable Needs, Self-Efficacy.*

# 1 INTRODUCTION

Information technology (IT) has evolved step by step by man; it is his crystallized wisdom. Technologies are viewed as tools for carrying out individual tasks (Goodhue & Thompson, 1995), and the necessity for them has come about because of people's requirements. IT has become an essential tool for modern man in his work place in particular. Task-technology fit (TTF) has mostly focused on the linkage between task and technology and the issue that a critical factor of the success of a task comes from the linkage between the person and the technology was almost overlooked. Recent research (Liu et al. 2011; Parkes 2013) on DSS has shown the importance of the linkage and fit between the individual and information technology because it affects a user's attitude and performance.

Recently, Parkes (2013) proved that the fit between the individual and technology will influence the user's attitude. Liu et al. (2011) also found that the individual-technology fit will govern the decision time in the DSS. Therefore, this research claims a theorization on the connection between user characteristics, technology characteristics and individual performance, and provides a framework for the construct of the user-technology fit concept regarding human needs, and computer self-efficacy.

User-technology fit (UTF) combines the perspective of a user's personal motivation (individual needs and ability (self-efficacy) with personal capabilities and user characteristics (personal innovativeness, experience), and then joins it with information technology characteristics as the primary antecedent elements for user-technology fit. Therefore, the core component of UTF is constructed upon combining the perspective of needs with equitable need theory (Au et al., 2008) and self-efficacy (Bandura, 1986). We are also trying to find out whether user characteristics and information technology are primary antecedent elements for user-technology fit, and whether they can give us a thorough explanation of why and how individual performance could be promoted, with or without utilizing such technology.

Consequently, from the perspective of personal motivation, ability and capabilities, this treatise successfully incorporates the user-technology fit into the traditional task-technology fit (TTF) theory of Goodhue (1995), with equitable needs from Au et al. (2008) and self-efficacy from Bandura (1986) as basic elements in the thinking, and so prove that the user must have enough computer literacy and capability to employ/use the information system. It would be desirable to find a conspicuous/obvious/pertinent/relevant mechanism for exploring the discernible linkage between human characteristics and information technology characteristics, and user-technology fit.

## 2 LITERATURE REVIEW

### 2.1 Equitable Needs (EN)

In equity theory, Adams (1965) suggested that people normally feel dissatisfied if his/her own input is greater than the benefits to be achieved, disregarding/(apart from) the benefit /input ratios of the others (Pritchard 1969; Oliver 1980; Au et al., 2008). Adams (1965) defined input as a person who recognizes his/her accession to be an exchange, and expects an even return to be paid back to him. According to equity theory, Huseman et al. (1987) believe that three equity sensitivity constructs exist; first is the "Benevolents" which refers to the individuals who think more of giving than receiving; second is the classical model of equity theory; the "Equity Sensitive" individuals are satisfied when their outcome/input ratio equals that of others'; the third construct is the "Entitleds", which alludes to people who feel like having the higher status of being indebted, they feel others are obliged to help them with no return or compensation. Huseman et al. (1987) depicted the equity theory by claiming

four propositions: First, individuals evaluate their relationships with others by estimating the outcome/input ratio of a relationship compared to the others' ratio. Second, inequity exists with people who perceive an unequal outcome/input ratio of relationship in comparison with others. Third, people feel more distress when the inequity ratio becomes bigger. Last, when an individual feels more afflicted, he will work harder to restore equity and reduce the distress. Cable and Edwards (2004) asserted personal characteristics comprise an individual's biological or psychological needs. They believe that personal psychological need fulfilment is his cognitive perception about the desired materials compared with the amount that has been supplied. (Sorry, I don't understand this last sentence. – Jan)

In 2008, Au et al., based on the equity theory (Adams 1965), identified the equitable needs fulfilment as the ratio between benefits and inputs, and that people's different types or hierarchical levels of need was critical to predicting satisfaction. In this model of Au et al. (2008), work performance fulfilment is the user's basic need to be fulfilled, using IS with ease to carry out his assignments. The related fulfilment refers to the users' required social interactions with other people. Finally, the higher-order needs of users is the self-development fulfilment which focuses on an individual's self-growth and self-advancement, such as an individual's getting a job promotion, or meeting work challenges, etc. by using the information system and the individual's self-actualization and self-fulfilment that he or she's needs for self-upgrade. People's requirements and needs change with time and the specific environment surrounding them. In fact, if people's psychological mood changes and they feel that they are no longer needed, then any useful information technology can become useless/redundant, no matter how useful/practical and easy to use it is..

## **2.2 Self-Efficacy (SE)**

Bandura (1977) suggested that personal efficacy expectations are based on four sources: performance accomplishment, vicarious experience, verbal persuasion, and emotional arousal. Bandura (1977, 1997) defined self-efficacy as the conviction that one can successfully execute a given behavior. Thereupon/So/Hence, in 1997, Bandura asserted that a person who is noticing or visualizing others' successful works which are similar to his tasks, will typically raise his efficacy beliefs in his capability to master comparable activities. Compeau and Higgins (1995) defined computer self-efficacy as referring to a judgment of one's capability to use a computer and self-efficacy influences choices about which behaviours to undertake, and thus, ultimately, the mastering the computing behaviour. In other words, people who believe in their own ability to perform will make the effort and persist in the face of obstacles. Venkatesh et al. (2003) believed self-efficacy illustrated the judgment of one's ability to use a technology (e.g., computer) to accomplish a particular job or task.

Lewis et al. (2003) manifested/demonstrated/showed that the belief about information technology usage can be influenced by the individual factors of personal innovativeness and self-efficacy, and argued that such innovativeness and computer self-efficacy are important predictors of technology acceptance. In this study, we believe that self-efficacy is about people who not only possess knowledge but also have the ability to operate information technology with ease. Although, Bandura (1986) argued that self-efficacy referred to the perception of people about what they can do with the skills they possess, and it will become harder to upgrade individual performance, if people are without the right or good information technology at hand. Self-efficacy is also considered to be one of the two external variables (SE and facilitating conditions) that affects users' perceived behavioural control of accepting new information systems (Taylor and Todd, 1995; Bhattacharjee, 2000). However, self-efficacy here is only in regards to personal capability; it has not been observed/considered in relation to personal needs.

## **2.3 User-Technology Fit (UTF)**

By summarizing the equity theory (Adams, 1965), the equitable needs fulfilment model (Au et al., 2008) and the concepts of equity sensitivity constructs from Huseman et al (1987), this study suggests that three types of user-technology fit should exist: benevolent, equity, and entitled fit. These types of fit are introduced in the succeeding section of this research. Accordingly, this study defined user-technology fit as the degree to which a technology matches an individual's portfolio needs and realizes his or her resolutions.

Although the personal adoption of technology has been studied extensively in the workplace for a long period of time, IT research has identified one belief that influences the acceptance of new IT - perceived usefulness (Davis 1989; Taylor and Todd 1995). Before applying any technology to improve user output performance, it must be accepted or adopted by the one who is using it, in other words, when a person has the right IT, he has the opportunity to improve his own output performance. From the perspective of the hierarchy of needs from Maslow (1943), as to whether user characteristics and information technology are primary antecedent elements for user-technology fit, the UTF model is built on the reflection that the individual person could need IT as an external aid for finishing his tasks more efficiently; but the fit between person and technology should happen first.

## **2.4 Antecedents of UTF: User and Technology Characteristics**

### *2.4.1 User Characteristics*

Cable and Edwards (2004) argued that an individual's characteristics may include his biological or psychological needs, values, goals, abilities, or personality. Agarwal and Prasad (1998) suggested that an important individual difference variable, personal innovativeness (PI) with respect to information technology would help us to further understand how perceptions are formed and the subsequent roles they play in the formation of usage intentions in a context of acceptance of new information technology. Straub et al. (1997) found that there existed differentiations in the acceptance of IT innovations (E-mail) across three different airlines' employees. In 2003, Lewis et al. argued that PI is in the period of time in which a person adopts an innovation, therefore, the person is characterized as innovative. Agarwal and Prasad (2000) defined 'PIIT' as referring to personal innovativeness in the domain of information technology, and later, they also suggested that persons who are high in PIIT are more likely to seek out "stimulating experiences," and demonstrate more self-confidence in their capacity to use a new technology (Agarwal et al. 2000).

Thatcher and Perrew (2002) revealed that personal innovativeness in information technology should have a positive relationship/correlation with computer self-efficacy, and a negative relationship/correlation with computer anxiety. We adopted the instrument of Agarwal and Karahanna (2000) to assess the PI of user characteristics. Characteristics of individuals (training, computer experience (or literacy), motivation) could affect the degree as to how easily they are able to utilize the technology for accomplishing a task (Goodhue, 2006). People use technologies to support them in performing their assignments. Therefore, the characteristics of a person may influence how easily and well he utilizes the technology (Goodhue and Thompson, 1995). In 1990, Nelson revealed that individuals vary in terms of cognition, affect, motivation, and skill. Agarwal and Prasad (1999) found that there exist many personal traits which are composed of individual differences, such as personality, demographic, cognitive style and so on. Later, they defined five individual differences (organizational role, tenure, education, experience and training) as a set of individual characteristics. Thompson et al. (1994) found that an individual's experience grew with IT adoption and use, and he would apply this expertise to his current job to gain benefit.

### 2.4.2 *Technology Characteristics*

Orlikowski and Iacono (2001) enumerated that the IT artifact has five conceptions being adopted in the IS realm: the tool, proxy, ensemble, computational, and nominal view. The first view is to take IT as an engineered tool that does what its designers have intended and it is assumed to be a tool. The second view is the proxy view, in which IT is conceptualized by its essential characteristics, which are defined by individual perceptions of its usefulness or value, and the interaction of people, and technology in both the development and use of it. The third is the ensemble view. The fourth is the computational view which focuses on system development and testing, as well as data modelling and simulation. And the last is the nominal view, which suggests that IT is not conceptualized and appears only in name but not in actual fact (Melville, 2004). Goodhue and Thompson (1995) viewed technologies as tools used by individuals for the carrying out of their tasks. In TTF, technology is referred to as the hardware, software, and data of computer systems and its user support services which include training, help lines, and on-line supports etc. However, researchers still debate about what we know and don't know about how information technology (IT) contributes to an individual's performance.

One stream of previous IT research has identified a belief that influences the acceptance of new IT - perceived usefulness (Davis 1989; Taylor and Todd 1995). The most postulated statements are that individually perceived usefulness is an important determinant of an individual's acceptance of information technology. The other research stream has focused on the business value of IT which depends on the type of IT, management practices, and organizational structure, as well as the competitive and macro environment (Melville et al, 2004); but the fundamental nature or characteristics of information technology has rarely been discussed exclusively on its own. The commonly used IS attributes in many previous studies can be classified into three groups: system quality, information quality, and support services quality (Myers et al. 1997). In 2003, DeLone and McLean also postulated that these three important factors of IS will affect its success. This study adopted the instrument of Doll and Torkzadeh(1988) and according to these academic studies' research results, information technology characteristics can be summarized into these three categories: information, system, and service quality.

## 2.5 **Consequences of UTF: Utilization and Performance**

### 2.5.1 *Utilization*

Today, people who are talented not only need to possess knowledge but also the ability to collect and integrate the information technology at hand within the context of their experience, expertise and judgment for the solving of any enigma. Goodhue (1995) argued that utilization is the behaviour of employing the appropriate technology to complete the task. In developing the construct of TTF, Moore and Benbasat (1991) defined voluntariness of use as "the degree to which the use of the information system services is perceived as being voluntary". In the classical TTF model, utilization is not mandatory, the same as in our study, the impact of TTF on utilization had showed via a link between task-technology fit and beliefs about the consequences of using a system, and the impact of UTF on utilization will also show via a link between user-technology fit and beliefs about the consequences of using a system. (This is a very long sentence- Jan)

Au et al. (2008) defined information system performance as the perceived outcome from IS use. The way to measure utilization according to Goodhue and Thompson (1995) is by asking users to enumerate the accessible/available information systems in their companies, and to let the respondents self-evaluate the extent of their dependence on up to five of them. The degree of dependence on these systems is rated on a three point Likert's scale (1: not very dependent; 2: somewhat dependent; 3: very dependent). Accordingly, the overall measure of utilization in this study is the sum of the dependence rate on these information systems.

### 2.5.2 Performance

With information technology becoming ubiquitous in human life, personal computer literacy will increase and mature over time, and self-efficacy will be an important factor for explaining individual and performance outcomes (Lewis et al., 2003). The reason why a user-technology fit is essential to upgrading individual performance is because it focuses on how people choose information technology tools that will fulfil their requirements, and realize their resolutions.

In 2008, Au et al. defined information system performance as the perceived outcome from IS use. Venkatesh et al. (2003) asserted that performance expectancy could be defined as the degree to which an individual believes that using the system will help him to be recognized as a high achiever in the workplace. Goodhue and Thompson (1995) believed that, in the field context, it is impossible to measure performance impact in an unbiased manner. Consequently, this study uses the two questions of measure performance impact that were reserved until the final results of Goodhue and Thompson's (1995) study. The respondents were asked to self-evaluate the performance impact of the information systems on their work.

## 3 RESEARCH FRAMEWORK

### 3.1 Research Framework

In this study, we define user-technology fit (UTF) as the degree to which a technology can match individual portfolio characteristics and realize his or her resolutions. The TTF model of Goodhue (1995) constructed and sketched the linkage between task-technology fit and beliefs, and he also demonstrated the impact on utilization of the consequences of using the information system. Thereupon, according to the early empirical research of TTF, we are able to construct the prototype of a revised task-technology fit model as shown below. (Figure 1)

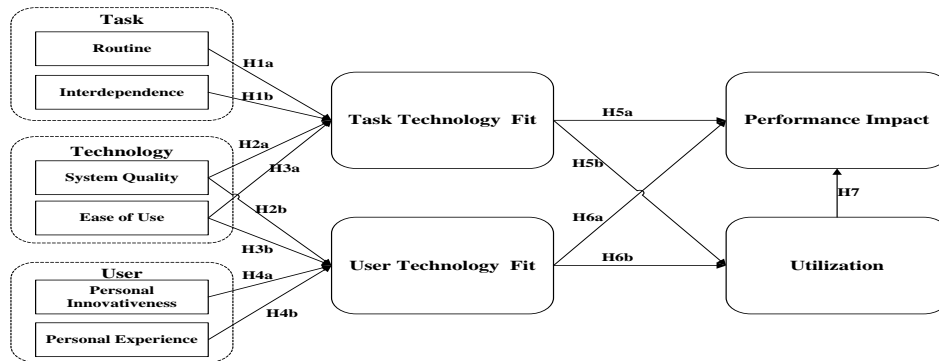


Figure 1: Research Framework

### 3.2 Research Hypotheses

The selection of these variables is supported by reviewing previous studies in the IS literature. Figure 1 illustrates the proposed research framework. Eventually, according to the literature review and well-known studies, we raised thirteen hypotheses and summarized them as listed below in Table 1.

Hypotheses	
H1a	Non-routineness of task will not positively influence user evaluations of task-technology fit
H1b	Task interdependence will positively influence user evaluations of task-technology fit
H2a	System quality of information technology will positively influence user evaluations of task-technology fit
H2b	System quality of information technology will positively influence user evaluations of user-technology fit

H3a	Ease of use of information technology will positively influence user evaluations of task-technology fit
H3b	Ease of use of information technology will positively influence user evaluations of user-technology fit
H4a	Personal innovativeness will positively influence user evaluations of user-technology fit
H4b	Personal experience will positively influence user evaluations of user-technology fit
H5a	Task-technology fit will positively influence user evaluations of performance impact
H5b	Task-technology fit will positively influence user evaluations of utilization
H6a	User-technology fit will positively influence user evaluations of performance impact
H6b	User-technology fit will positively influence user evaluations of utilization
H7	Utilization of information technology will positively influence user evaluations of performance impact

*Table 1: Research Hypotheses*

## 4 RESEARCH METHOD

### 4.1 Measurement Development

In this study, we discuss the match between human and technological characteristics. A step-by-step process following Hinkin's (1995) procedures, was conducted to develop user-technology fit (UTF). This was done by determining in which context people will take the technology that they may need. Since there is no adequate academic basis to construct a user-technology fit instrument and because this realm is still new to MIS researchers, there is a lack of a sufficient set of constructs, models, methods, and tools for accurately representing the needs of people in regard to technology. It is therefore necessary to develop an adequate scale for measuring the UTF construct without a proper measuring instrument. Regarding instrument construction, the items used for investigating the variables of UTF were selected primarily from previous studies.

Consequently, the conceptual construct definitions of user technology fit were generated from several items from the past literature. Bohrnstedt (1970) asserted that carefully selecting the initial scale items would help to secure its content validity. Specifically, the items for measuring UTF are listed in Table 2. The items of self-efficacy have been carefully adapted from Venkatesh et al. (2003), and those for measuring work performance fulfilment, relatedness fulfilment, and self-development fulfilment have been incorporated from Au et al. (2008). Hinkin (1995) suggested several steps that could be adopted in the development of an instrument: First, to search the literature and conduct an initial pretest of the scale to develop the measure. Second, a pilot test of the measurement should be adopted. Finally based on the results of the pilot study, and modifying the instrument scale, the criteria for the initial items can be used to obtain end results.

### 4.2 Pretest

The pretest was implemented to improve the face validity of the UTF instrument. This research used a panel of related experts to develop the questionnaire and constructs. They then used the questionnaire to survey 13 experts (including 5 academic and 8 practice experts) via a website. In the process of the survey, each expert on the website was given the opportunity to participate in the revision and offer advice for this study. There also was a skilled moderator or facilitator who led the website in a free and open manner to keep the revision from straying too far away from the topic of interest. Opinions and descriptions were elicited from these expert respondents.

### 4.3 Pilot Study

For convenience, the sample of the UTF pilot test was drawn from the employees of a regional subsidiary of NTA (National Tax Administration) of Taiwan. The target organization was a governmental bureau of NTA, belonging to the Ministry of Finance of Taiwan, the National Tax of Southern Taiwan Province (SNTA). The SNTA is in charge of the tax service for southern Taiwan (the areas including Chiayi County, Chiayi City, Tainan County, Tainan City, Kaohsiung County, Pingtung County, Taitung County and Penghu County). During the time-period of the pilot test, the

employees of SNTA were allowed to give their opinions online, and a total of 101 respondents were sampled from this population.

The convergent validity of the UTF pilot test was assessed by two criteria: composite construct reliability, and average variance extracted (AVE) ( $>0.5$ ) (Fornell and Larcker, 1981) as listed in Table 3. Third, the discriminant validity of UTF which is assessed by the squared root of AVE for each construct should be greater than the correlation between constructs (Fornell and Larcker, 1981). The results of the validity and reliability are reported in Table 3. According to the value of convergent and discriminant validity, we found that the UTF met all the criteria and the value of composite reliability also showed that the UTF almost met the acceptable criteria (between 0.684 and 0.882) of reliability.

#### 4.4 Empirical Study

The empirical survey was administered to participants from 11 companies coming from two kinds of industries, the high-tech industry and the traditional industry. The manufacturers of the high-tech industry included software design, DMS (design and manufacturing service), note-book, LED (light-emitting diode) and IC assembly and testing services. The traditional industries included manufacturing, medical, financial, insurance, educational and government agencies of Taiwan. In other words, we framed the sample of skilled IS workers from eleven companies in Taiwan. The main target industries were IT related, including the IT products manufacturing industry or IT service industry. The planned target sample size of each stage (pretest, pilot test and empirical study) followed the sample size of the famous scales of the IS field. And according to Hair et al. (1998)'s suggestion, for validation, the sample size should be five times the numbers of variables, at least. So, our study the total number of questions was sixty, and the final total effective samples comprised 344 participants recruited from eleven organizations in Taiwan.

##### 4.4.1 Reliability and Validity

Our study attempted to develop a measure for UTF, and test the instrument's reliability of CFA (Confirmatory Factor Analysis) and validity by examining its nomological validity, and verified the parsimonious model of UTF. The sufficient square root value of AVE (average variance extracted) versus the value of the correlation coefficient, and with the adequate composite reliability of UTF's measurement, was in the range between 0.58 and 0.878.

Hair et al. (1998) argued that "validity is the extent to which the indicators precisely measure what they are supposed to measure". Anderson and Gerbing (1988) suggested that the assessment of convergent validity requires assessing the loading of each observed indicator on its latent construct. Thereupon, the sufficient square root value of AVE (average variance extracted) versus the value of the correlation coefficient, ranged between 0.683 and 0.910. And it also revealed an adequate composite reliability of all model measurements, in the range of between 0.829 and 0.941.

##### 4.4.2 Results of the Structural Model

Some common fit indices reported in SEM are designed to identify model goodness-of-fit. Table 2 shows nearly all exceeded their respective common acceptance levels, suggesting that the research model provided a reasonably good fit to the data.

Fit Index	Recommend Criteria	Result
$\chi^2/df$	$\leq 3$	2.001
GFI	$\geq 0.8$	0.779
NFI	$\geq 0.8$	0.835
IFI	$\geq 0.9$	0.921
CFI	$\geq 0.9$	0.920

RMSEA	$\leq 0.06$	0.054
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Table 2: The Indices of Goodness-of-fit

The results of SEM analysis are illustrated in Figure 2. Seven of the 13 hypothesized paths were found to be significant. The H1a, H2b, H4b, H5b, and H6b were found to not support our study. Figure 7 displays all the structural relationships among the studied constructs. The figure indicates that the research model explains 56% of the variance in performance impact. Variance in the individual performance impact is 56%, entirely explained by the UTF, TTF, and utilization. According to Hair et al. (1998)'s suggestion, we did drop those items with standard loadings  $< |0.5|$ , in CFA. As noted in the research model, the performance impact of users can be effectively explicated by looking at relevant user characteristics (personal innovativeness and experience), technology characteristics (system quality and ease of use), task characteristics (routine and interdependence) and utilization of the information system.

The final results of SEM analysis of the complete model are summarized in Table 3, and some interesting findings were revealed. First, the routineness or non-routineness of one's personal job is not affecting TTF significantly. The reason for this is that people who are working in mature organizations may not meet ill-defined business problems frequently, because all unexpected situations are probably controlled by some other mechanism in the company. Therefore, there is not the concern to have them matched with their particular technology tools. A non-routine job may become their opportunity to increase their power over others or over another division so that their output performance is positively strengthened.

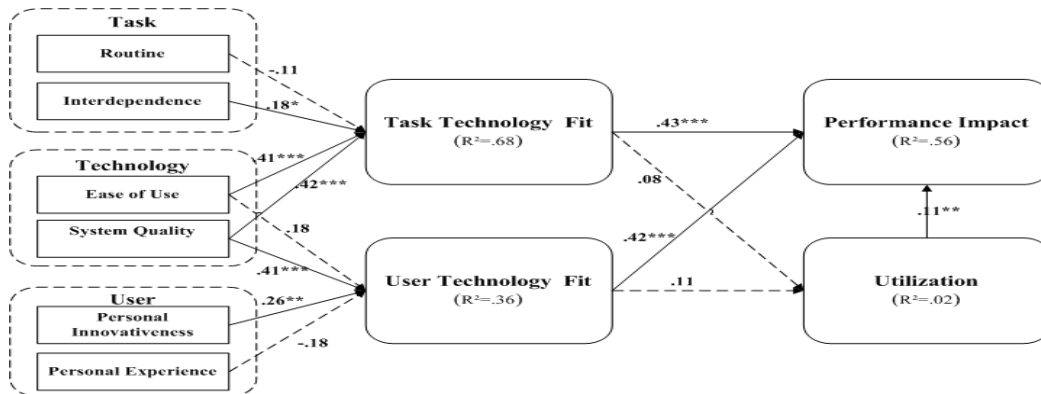


Figure 2: Results of the Structural Model

The second concern in our study is why the user's experience is not affecting UTF. It might be because their personal experience of information has been developed. The new experience might become a burden to him, because he will be used to using well-known familiar tools, and may find it hard to accept the new know-how of information technology. Third, the other concern is focused on why the research result did not give us enough evidence to prove that UTF will positively affect the utilization of the information system. In order to explain this situation, the incentive might come from the fabrication of UTF. In the congruence between technology and individual needs, UTF concentrates on combining the perspective of the user's personal motivation (individual needs) and ability (self-efficacy) with personal capabilities and user characteristics first, then users can focus on effective utilization of information technology.

The equitable need (Au et al., 2008) and self-efficacy (Bandura, 1986) factors are more focused on the personal psychological feeling about information technology, therefore, when a person feels the technology matches what he needs and he also has the capability to manage it, he might upgrade his personal performance immediately, even without using any new information technology. These personal output performances could be induced from the fulfilment of personal psychological feelings.

In other words, usage of information systems might be a lagging indicator about personal performance impact.

	Hypothesis	Hypothesized direction	Critical ratio	Finding
H1a	Routine → TTF	-	-1.331	Not Supported
H1b	Interdependence → TTF	+	2.071*	Supported
H2a	Ease of Use → TTF	+	4.999***	Supported
H2b	Ease of Use → UTF	+	1.596	Not Supported
H3a	System Quality → TTF	+	5.049***	Supported
H3b	System Quality → UTF	+	3.447***	Supported
H4a	Innovativeness → UTF	+	2.617**	Supported
H4b	Experience → UTF	+	-1.595	Not Supported
H5a	TTF → Performance	-	6.890***	Supported
H5b	TTF → Utilization	+	1.142	Not Supported
H6a	UTF → Performance	+	6.061***	Supported
H6b	UTF → Utilization	+	1.471	Not Supported
H7	Utilization → Performance	+	2.696**	Supported

Table 3.A Summary of the Research Findings

## 5 EXPECTED CONTRIBUTION

The notion of user-technology fit (UTF) has originated from a missing link/linkage in the tripartite nature of TTF. The UTF model is based on the idea that the individual person needs IT and is capable of using it as an external aid to address their tasks more efficiently. Accordingly, the core component of UTF was then constructed from the needs perspective of Au et al.(2008) and self-efficacy (Bandura, 1986).

### 5.1 Implications for Research

Regarding the fact that TTF seems unable to display the linkage between humans and technology clearly and people are inherently different in terms of how they acquire and process information while engaged in finishing/completing a job or solving a problem, Table 4 shows there is statistical evidence proving that it is necessary to separate UTF as an independent construct from TTF. The results of SEM analysis of our full model's study about the second order property are illustrated in Table 4, and the indications show that if the UTF construct can be separated from the traditional TTF construct, it will have better fit indices than keeping them together.

Model	X <sup>2</sup>	df	X <sup>2</sup> /df	P	PNFI	CFI	NFI	RMSEA	GFI
TTF Only	2270.17	1363	1.666	0.000	0.771	0.939	0.862	0.044	0.819
UTF+TTF	1524.31	1280	1.191	0.000	0.703	0.983	0.907	0.024	0.872

Table 4: Comparison of Two Models

The UTF model is built on the idea that an individual needs IT and is capable of using IT as an external aid to finish tasks more efficiently. From this perspective, this study tries to find out if/whether UTF is a second order construct or not. We tested two situations, firstly we assumed that UTF is a first order construct and compared the results of CFA findings with that, then we assumed that UTF was a second order construct.

## **5.2 Implications for Practice**

Regarding the practitioner sector, since, end users' needs always change over time, it usually requires a greater effort to figure out the right system requirements from end users. People are inherently different in terms of how they acquire and process information while engaged in finishing a job or solving a problem. Our first finding for actual application was that user experience negatively affects UTF. An organization often needs to recruit new skilled persons. But, nowadays, information technology has become ubiquitous in human life, and new technology and its applications are changing dynamically and dramatically more than ever before. Therefore, personal computer literacy will have to be upgraded and kept in line with information technical/technology trends.

In fact, mandatory utilization still affects personal usage of information systems obviously. In a formal organization, where officially approved information systems exist, employees will have not too many choices regarding the information systems they use or favor to use. However, experienced people need to use these official tools, even though they might not be the most suitable or appropriate for them. Consequently, the personal experience might become a burden to them, because they will be used to the well-known tools only, and will find it hard to accept anything new. According to this finding, we can suggest that when businesses need to recruit new blood, they should consider which kinds of jobs need experienced persons and which don't. Our second finding is that the utilization of information systems could be a lagging indicator of personal performance impact. In fact, if an organization needs to upgrade personal performance, they should consider UTF first.

However, dedicated technology tools are always prerequisites to the successful execution of a job. Nevertheless, the success of a task will depend on who employs these eminent tools. Information technology is increasingly permeating all aspects of personal life, and individuals with a wide variety of backgrounds, prior experiences, and personalities need to use these technologies for coping with each situation in their daily living. Organizations can use the measurement of UTF to gauge an individual's needs for information technology beforehand, because it will be helpful to building a more successful information system or IT artifact if it meets end users' diverse needs.

## **5.3 Limitations and Future Research**

Although we followed the way of measuring utilization according to Goodhue and Thompson's (1995) suggestion by asking users to enumerate and key-in an information system list in their companies, we found that, the UTF didn't affect utilization significantly. This could be due to the fact that it is difficult to measure information systems' usage among different kinds of industries. Different companies would have differing information systems, and people in different positions would have their own particular access to information systems. So how to measure system usage effectively and precisely still remains an issue. Goodhue (1995) suggested that researchers should not need to consider a mandatory utilization. But in fact, mandatory utilization should obviously still affect personal usage of information systems. In a formal organization, there exist officially approved information systems, and people within the company will not have too much choice to choose the information systems that they are used to using or prefer. On the contrary, people have to use the officially provided tools, even though they might not be up to the preferred standard.

Finally, we suggest that future research may focus on how to improve the measurement of information system usage more precisely and effectively, not just by frequency counts of information use or the level of reliance on them.

## **6 CURRENT PROGRESS: Completed paper.**

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