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Research article

An empirical investigation into the utilization-based information technology success model: integrating task-performance and social influence perspective

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Abstract
This paper develops the utilization-based information technology (IT) success model by integrating key variables from IT acceptance and IT success literatures, and empirically validates it. The model shows relations among IT utilization, performance expectancy, social influence, and user satisfaction. A field study was undertaken to evaluate and test the relationships via structural equation modeling using LISREL. The path from performance expectancy and user satisfaction to IT utilization was positive and significant. While the path from implicit social influence to IT utilization was found to be significant, explicit social influence had no significant influence on users' IT utilization. Implications and future research directions are drawn.
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Introduction

As information technology (IT) becomes one of the most important strategic business tools, larger IT investments are being made. While many IT researchers have been focusing on IT acceptance, IT practitioners have been especially interested in investigating the impact of IT acceptance on IT success in terms of organizational or individual performance. While IT acceptance research (Davis, 1989; Davis *et al*., 1989; Venkatesh *et al*., 2003) has made significant contributions to explaining and modeling IT use, little research has been done on the link between IT acceptance and IS success with respect to individual (or organizational) performance. This study attempts to link IT acceptance to IT success by integrating key variables from both IT acceptance and success literatures.

The mainstream IT utilization and success research does not appear to have paid sufficient attention to social factors. As new technology has been evolving quickly, many new systems have been produced, giving IT users more alternatives to use. While users are inclined to rationally choose the best alternative (or alternatives) based on individual factors such as perceived usefulness and ease of use, users' reference groups such as supervisors might influence users, suggesting a certain alternative with positive evaluation or mandating the use of a certain alternative while explaining its necessity. Most users have the opportunity to communicate or cooperate with other organizational members through certain information systems that sometimes they may not be familiar with. Thus, social influence could be also an important factor in IT

utilization and success research. This paper also investigates the significance of social influence in this regard.

This study deals with social influence, performance expectancy, and satisfaction as important sources of influence on IT utilization. While past studies have addressed these constructs in different contexts, they have not examined all of them in the one model. This article may not only replicate previous studies on IT utilization in that it investigates the effect of such constructs on IT utilization but also extends them by having two different sub-constructs (i.e., explicit and implicit influences) of social influence as well as including all of such constructs of IT utilization and success research in a single model. Berthon *et al*. (2002) argued that replication is a critical component of research and plays important roles in producing IS knowledge.

Most IT acceptance research has been trying to find a powerful model without the expense of model's parsimony. We also attempted to achieve this goal by choosing the most important (i.e., predictive) variables from the IS acceptance and IS success literatures, and pursue better goodness-of-fit, explanatory power, and parsimony. In addition, Legris *et al*. (2003) pointed out the limitations of involving students in IT acceptance research, and suggested that further research should be done in a business environment. This study tests a model using subjects from large firms to help IS practitioners to effectively manage IT acceptance and ensure IT success.

Theoretical background and model development

IT utilization and social influence

Social information processing theory proposed that acquiring a belief, developing an attitude, and making a decision can be influenced by one's coworkers (Salancik and Pfeffer, 1978). Shibutani (1955) described the concept of reference group as follows: '(1) groups which serve as comparison points; (2) groups to which a person aspires; and (3) groups whose perspectives are assumed by the actor.' Reference groups such as supervisors in the firm context can be influential on deciding IT utilization. Fulk and Boyd (1991) and Fulk (1993) describe overt statements, vicarious learning, interpretations of events, social definitions of rationality, and provisions of standards from work groups, ego networks, and supervisors as sources of social influence. They maintained that these forms of social influences on both technology perceptions and use would influence the perceived appropriateness of behaviors and be influential in rationalizing workplace activities.

Empirical results on the relationship between social influence and utilization behavior have not been consistent. Fulk (1993) found a positive relationship between social influence and utilization behavior. Schmitz and Fulk (1991) found that individuals' communication technology use was predicted by communication network members' actual use. However, Davis *et al*. (1989) found no significant relationship between social factors and usage behavior. Lewis *et al*. (2003) also found that perceived social influence from referent others had no significant influence on individual beliefs about usefulness. The recent study (Gallivan *et al*., 2005) found that not coworkers' perceived usefulness of IT but coworkers' actual usage of IT was a strong predictor of the individual's use of IT.

Fishbein and Ajzen's (1975) theory of reasoned action and Ajzen's (1991) theory of planned behavior suggest that behavioral intentions are influenced by 'subjective norms,' a term defined as 'a person's perception that most people who are important to him think he should or should not perform the behavior in question (Fishbein and Ajzen, 1975).' Venkatesh and Davis (2000) extended TAM by incorporating social influence constructs. They found that subjective norm had a positive direct effect on intention to use only when system use is perceived to be mandatory. And they also found that subjective norm had a positive direct effect on perceived usefulness.

After a new information technology is introduced into an organization, users familiarize themselves with its good and bad features. As they use the new technology, they sometimes communicate with managers about their experience of using it. If they regard managers as reference group members, their positive evaluation of the technology will positively influence IT use. According to social learning theory (Bandura, 1986), observational learning occurs by users observation of other individuals' behavior. This will have a significant influence on utilization. Information from one who is regarded as an important referent person will have a significant impact on the recipient's utilization behavior. Here we extend Venkatesh's *et al*. (2003) study by having two different sources of social influence, 'reference group suggestion' and 'reference group utilization.' The difference lies in the extent to which social influence is explicit. For instance, reference group utilization could be considered an implicit source of influence (i.e., you use email because everyone else is using it), whereas reference group suggestions are an explicit source of influence (i.e., you use email because you are told to use it). This study proposes that both explicit and implicit sources of social influences will have significant influences on IT utilization behavior.

Hypothesis 1 : Explicit source of social influence positively affects IT utilization.

Hypothesis 2 : Implicit source of social influence positively affects IT utilization.

IT utilization and performance expectancy

Users mainly utilize IT to perform or facilitate their job-related tasks. Users are expected to select and use a certain IT that they believe will maximize their job performance. Here, we suggest performance expectancy as another factor related to IT utilization. Performance expectancy refers to the extent to which an individual expects gains in task performance from IT use (Venkatesh *et al*., 2003). In the information systems literature, performance expectancy has been addressed in a number of IT acceptance models using similar constructs such as perceived usefulness, extrinsic motivation, task-fit, relative advantage, and outcome expectations (Venkatesh *et al*., 2003). All these constructs are operationalized using the same or similar measurement items. Performance expectancy has been chosen in the research model of this study because it was the most

important and strongest predictor of IS use behavior in Venkatesh *et al*. (2003). Here we propose the following.

Hypothesis 3 : Performance expectancy positively influences IT utilization.

IT utilization and user satisfaction

IT success can be defined as the extent to which an IT contributes to individuals (or organizations) achieving their goals (Kim, 1990). This definition is helpful to both IT researchers and practitioners. However, it is difficult to measure IT success because it includes some intangible concepts. The difficulties in isolating the net effect of the IT from other effects cause researchers to develop surrogate measures which are easier to measure (DeLone and McLean, 1992). Among the various measures, utilization and user satisfaction are the most widely selected surrogate measures of IT success (Amoroso and Cheney, 1991, Schiffman *et al*., 1992). DeLone and McLean (1992, 2003) proposed a comprehensive and multidimensional model of information systems (IS) success, which includes utilization and user satisfaction.

The relationship between utilization and user satisfaction has often been studied in the literature (Srinivasan, 1985). While Ginzberg (1981) and Sanders (1984) found that there were low correlations, Robey (1979), Baroudi *et al*. (1986), and Igbaria and Nachman (1990) found a strong relationship between them. In this study, we expect that user satisfaction will have significant positive influences on IT utilization. The theory of reasoned action (Fishbein and Ajzen, 1975) suggests that if a person has a positive affect towards an object (e.g., an IT), (s)he is more likely to perform a behavior related to the object (e.g., IT use). Satisfaction is generally considered an affect towards an object. Thus, we suggest that a person who feels a positive affect towards an IT (e.g., higher satisfaction) is likely to utilize it. But, it will be also expected that a person with a negative affect towards an IT is likely to reduce (or stop) the use of the IT. The more satisfied users are, the more likely it is that they will utilize it. Here, we propose the following.

Hypothesis 4 : User satisfaction positively influences IT utilization.

Based on the propositions described above, we can build the research model of this study, as shown in Figure 1. The model shows both explicit and implicit sources of social influence, IT utilization, performance expectancy, user satisfaction, and relations among these, attempting to integrate key constructs from IT acceptance (Venkatesh *et al*., 2003) and IT success literatures (DeLone and McLean, 1992, 2003). As indicated in Figure 1, performance expectancy, user satisfaction, and two sources of social influence positively affect IT utilization.

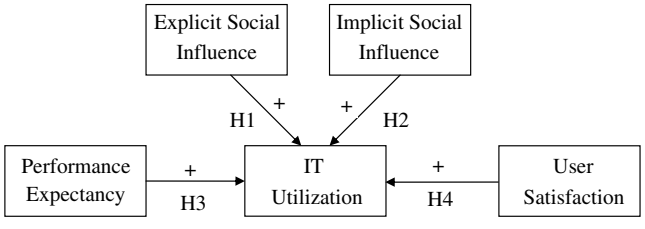

Figure 1 Research model and hypotheses.

Study results

Methods

Given the nature of the research model presented above, we employed an empirical survey method using the questionnaire to validate the model. The survey instrument was developed and distributed first to the focus group (corporate-sponsored MBA students) to refine the instrument and to identify important IT applications in organizations. Respondents were asked to provide their usage hours of several IT applications listed in the questionnaire such as word processing, computer-mediated communication software (CMCS), spreadsheet, database, graphics, and so on. According to their responses, word-processing and CMCS were the most important and widely adopted IT applications. Based on their feedback on clarity of meaning and readability, the questionnaire was slightly modified.

Data were collected from IT users of 15 large firms. A total of 421 questionnaires (210 word-processing software users and 211 CMCS users) were distributed and a total of 262 questionnaires (136 word-processing software users and 126 CMCS users) were returned. The response rates from word-processing software and CMCS users were 64.8% and 59.7%, respectively. According to the power analysis method of MacCallum *et al*. (1996), it was determined at least 95 subjects would be required to realize an acceptable level (80%) of statistical power of the test for the research model of this study. Two hundred and sixty-two subjects participated in this study, providing sufficient statistical power. Table 1 shows the characteristics of the subjects.

Measures

Relevant measures were collected from the literature and adapted to our research context, as shown in Table 2. Appendix A indicates the detailed measurement scales used to operationalize constructs of this study.

Explicit social influence (i.e., reference group suggestion) was measured by asking respondents to rate their reference group's suggestion of the use of the software. Different categories of reference group (e.g., supervisors and company executives) were listed along with the definition of each reference group. Respondents were asked to indicate their perceptions of suggestions made by each category of reference groups. In the same way, respondents were asked to indicate their perception of their reference group's actual IT utilization on a seven-point scale to measure implicit social influence.

IT utilization was measured as frequency of use, time of use, and dependency, in line with a frequently used measurement in literature as specified in DeLone and McLean (2003). The amount of usage time alone does not adequately capture the relationship between usage and

Table 1 Sample characteristics

	#[a]	%
Industry		
1. Machinery	35	13.4
2. Electronic	16	6.1
3. Auto parts	16	6.1
4. Semiconductor	16	6.1
5. Cement	12	4.6
6. Other manufacturing	14	5.3
7. Trading and wholesale	53	20.2
8. Telecommunications	46	17.6
9. Other services	54	20.6
Missing	—	—
Total	262	100
Age		
1. Under 25	50	19.1
2. 26–30	132	50.4
3. 31–35	63	24.0
4. Over 36	16	6.1
Missing	1	0.6
Total	262	100
Gender		
1. Male	208	79.4
2. Female	54	20.6
Total	262	100
Department		
1. Accounting, Finance	16	6.1
2. Strategic planning	36	13.7
3. Marketing	34	13.0
4. R&D management	37	14.1
5. General affairs	2	0.8
6. R&D	59	22.5
7. International affairs	2	0.8
8. Human resources	3	1.1
9. Others	55	21.0
Missing	18	6.9
Total	262	100
Education		
1. High school	23	8.8
2. Undergraduate	113	43.1
3. Graduate	125	47.7
Missing	1	0.4
Total	262	100
Work experience in current department		
Mean	30.8	Months
SD	29.5	Months

[a]Number of respondents.

positive outcome variables (DeLone and McLean, 2003). Frequency of usage is complementary to usage hours. Dependency is also useful in the situations in which mandatory usage is required (Goodhue and Thompson, 1995). Respondents were asked to rate how dependent they were on the system they were using by indicating the degree of agreement with each statement on a seven-point Likert-type scale ranging from (1) 'strongly disagree' to (7) 'strongly agree.'

Performance expectancy was measured by five items adapted from Venkatesh *et al*. (2003) and Thompson *et al*. (1991). User satisfaction was measured by adapting the scales developed by Doll and Torkzadeh (1988).

Data analysis and results

Since we employ a structural equation modeling (SEM) technique to test our structural model and thus to validate the relationships among constructs, it is a standard practice to perform the tests of the measurement model for reliabilities and validities (Gefen *et al*., 2000). Test results for the measurement model are shown in Table 3. The table includes composite reliability (CR), average variance extracted (AVE), and standardized factor loadings. As indicated in Table 3, composite reliabilities range from 0.831 to 0.930, which exceed the acceptable lower limit of 0.7 (Fornell and Larcker, 1981; Kim and Malhotra, 2005). Also, AVEs of the constructs are shown to meet the recommended criterion of 0.5 (Fornell and Larcker, 1981), although IT utilization is very close to this value. The standardized factor loadings are all shown to be significant. Discriminant validity can be established by showing that AVEs of the construct is greater than the squared correlation between that construct and another construct (Fornell and Larcker, 1981). When the correlation in Table 5 is squared, none of them exceeds the AVE of the constructs. This supports the discriminant validity of the constructs. Overall, the results support the reliability and validity of the measurement model of this study.

Means, standard deviations, and other descriptive statistics for the variables of this study are reported in Table 4. On average, respondents were using IT applications 3.82 h a day with the frequency of 'once a day'. Table 5 shows correlation coefficients of the variables used in this study. These coefficients are all positive and significant at $P<0.001$, meaning that all those variables are correlated with each other.

Hypotheses were tested via SEM using LISREL to validate the relations among constructs of the research model of this study. We estimated the path coefficients of the model by SEM using LISREL. Figure 2 shows the standardized path coefficients of the research model and fit statistics. The path coefficients from performance expectancy, user satisfaction, and implicit social influence to IT utilization are all shown to be positively significant. However, the path coefficient from explicit social influence to IT utilization is not found to be significant. Therefore, H2, H3, and H4 of this study are supported, whereas H1 is not supported.

The overall goodness-of-fit of the structural model was evaluated on the basis of four indices: χ^2 statistics, comparative fit index (CFI), standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA). Hu and Bentler (1999) recommended the following guideline for 'relatively good fit' of the structural model: SRMR $\leqslant 0.08$ and (CFI $\geqslant 0.95$ or RMSEA $\leqslant 0.06$). The structural model of this study meets their guideline, showing relatively good fit characteristics.

Table 2 Related research of measures

Constructs	*Related research*	*Number of items*
Performance expectancy	Venkatesh *et al.* (2003) Thompson *et al.* (1991)	5
Explicit social influence	Venkatesh *et al.* (2003) Fulk (1993)	5
Implicit social influence	Fulk (1993) Thompson *et al.* (1991) Gallivan *et al.* (2005)	5
User satisfaction	Doll and Torkzadeh (1988)	6
IT utilization		
Daily usage hours	Ein-Dor and Segev (1991), Ghani (1992), Igbaria (1990)	1
Frequency	Igbaria (1990), Thompson *et al.* (1991)	1
Dependency	Goodhue and Thompson (1995) Schiffman *et al.* (1992)	3

Table 3 Results of confirmatory factor analysis

Constructs	*Items*	*Composite reliability*	*Standardized loading*[a]	*Average variance extracted*
Performance expectancy	PE1		0.81	
	PE2		0.77	
	PE3	0.911	0.91	0.672
	PE4		0.75	
	PE5		0.84	
Explicit social influence	ESI1		0.77	
	ESI2		0.95	
	ESI3	0.930	0.82	0.730
	ESI4		0.88	
	ESI5		0.71	
Implicit social influence	ISI1		0.76	
	ISI2		0.86	
	ISI3	0.868	0.77	0.572
	ISI4		0.77	
	ISI5		0.59	
User satisfaction	US1		0.79	
	US2		0.81	
	US3	0.831	0.82	0.637
	US4		0.81	
	US5		0.82	
	US6		0.74	
IT utilization	UT1		0.71	
	UT2		0.67	
	UT3	0.913	0.83	0.498
	UT4		0.59	
	UT5		0.68	
Model fit indices			$\chi^2 = 501.038$, DF = 267, $P < 0.001$ RMSEA = 0.057, CFI = 0.979, SRMR = 0.055	

[a]All factor loadings significant at 0.05 level.

Table 4 Descriptive statistics for variables studied

Variables	*Abbreviation*	*Mean*	*SD*	*Min.*	*Max.*
Performance expectancy	PE	4.85	1.01	1.50	7.00
Explicit social influence	ESI	4.35	1.41	1.00	7.00
Implicit social influence	ISI	4.74	1.34	1.20	7.00
User satisfaction	US	4.78	1.01	1.00	7.00
IT utilization	UT	—	—	—	—
Daily usage hours	—	3.82	1.38	1.00	6.00
Frequency	—	5.28	1.02	1.00	6.00
Dependency	—	5.27	1.35	1.00	7.00

Table 5 Correlation coefficients for variables studied

Variables	*(PE)*	*(ESI)*	*(ISI)*	*(US)*	*(UT)*
Performance expectancy	1.000				
Explicit social influence	0.379***	1.000			
Implicit social influence	0.432***	0.618***	1.000		
User satisfaction	0.512***	0.310***	0.350***	1.000	
IT utilization	0.597***	0.334***	0.537***	0.511***	1.000

*** $P \leq .001$.

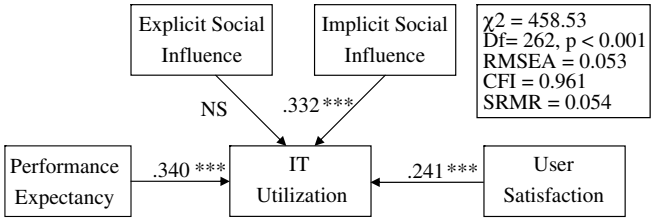

Figure 2 Results for the research model. Standardized path coefficient; NS = not significant; ***$P<.01$.

Discussion and conclusion

This study examined the reference groups' (such as supervisors and executives) suggestions and behavior as sources of social influences to IT utilization. The results found that implicit social influences (i.e., reference group utilization) have significant positive impacts on IT utilization, but explicit social influence (i.e., reference group suggestion) does not. We learned that users refer to their reference group's suggestion, but this suggestion itself does not affect their IT utilization behavior. Also, this study found the significant impact of performance expectancy on IT utilization. This suggests that expected task performance gains from IT use influence IT utilization. The fourth hypothesis that user satisfaction positively influences IT utilization is also supported. This shows that prospective users' affect or satisfaction towards an IT is an important predictor of their IT utilization behavior.

The theoretical implications of this study can be found in several points. First of all, this study suggests a new IT utilization-based success model includes IT utilization and its key antecedents in the one model. It also brings an integrated framework from task-performance perspective and social influence perspective to IT utilization research. Second, this study links two long-standing research streams related to IT utilization, which are IT acceptance and IT success researches, by combining key variables from each research stream. Third, this study has clarified the role of the social influence construct which had somewhat mixed results in relation to IT utilization in the literature. This study clearly shows social influence to IT utilization comes from an implicit source rather than an explicit source. This may explain why prior studies on social influence (mainly based on an explicit source) did not show consistently the significant direct effect of social influence on IT utilization.

Results from the study also provide practical implications for IS practitioners. It would be cost effective for IT managers to outsource (or develop) information systems that satisfy users' task performance expectancy. Also, IT managers should consider fit between IT and tasks to enhance users' task performance expectancy. After selecting the best software packages and systems, IT managers should also consider social influence strategies in organizations for successful IT implementation. A training program for users' supervisors and executives could enable them to recommend software packages and systems to users with more confidence. But, in order to make social influence strategies more effective, their recommendations need to be accompanied by demonstrations of their actual utilization.

We note the two applications investigated in this study (word processing and CMCS) are already widely being used, and thus users' opinions on social influence and performance expectancy in relation to their use might not be of great consequence. But, we have investigated the degree, frequency, and dependency (instead of the presence/absence of or intent to use) of utilization of even commonly used IT, and expected that they might have relations with other key variables from IT acceptance and

success literature. It seems that emails have now become necessity to users regardless of their satisfaction level. However, one of the objectives of this study is to validate the general hypothesis that a person who feels a positive affect toward an IT (e.g., higher satisfaction) will be likely to use it. Completely dissatisfied users may reduce IT use and pursue other alternatives (in our case, messenger software, simple message service (SMS), phone, etc.). While relatively new ITs should have been better for the validation of our research model from retrospective, we strongly believe the research model of this study is still valid even with the use of new ITs. However, future studies may need to examine the innovating IT and also consider the type of IT innovations (e.g., stand-alone innovation *vs* innovations with network externalities). In addition, future studies could be conducted in a wide variety of IT contexts ranging from general-purpose software to specific business process applications.

It needs to be noted that it may have strengthened this study to explore contingent variables such as users' IT experience and voluntariness of system use in relation to the research model. For example, future research should examine how the research model of this study performs in different contextual settings, ranging from strictly voluntary to strictly involuntary. In addition, if formal job requirements mandate system usage, the strengths of relationships in the model might be changed.

This study includes only one variable from each of the task-performance and social influence perspectives. Identifying new dimensions and expanding the model to add other important variables are another direction for future research. Finally, this study measured users' utilization and reference groups' utilization by self-reported items, and we employed only perceived measures for the other variables. Future research may include both subjective and objective utilization measures, such as system-monitored utilization hours.

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Appendix A

Questionnaire items[a]

Constructs	*Item*	*Measure*
Performance expectancy	PE1	Use of the software can decrease the time needed for completing my job-related tasks.
	PE2	Use of the software can significantly increase the quality of output of my job-related tasks.
	PE3	Use of the software can increase the effectiveness of performing job-related tasks.
	PE4	Use of the software can increase the quantity of output for same amount of effort.
	PE5	Considering all tasks, use of the software can be helpful for performing my job-related tasks.
Explicit social influence	ESI1	My colleagues recommend using the software for my job-related tasks.
	ESI2	My coworkers recommend using the software for my job-related tasks.
	ESI3	My supervisor recommends using the software for my job-related tasks.
	ESI4	My subordinates recommend using the software for my job-related tasks.
	ESI5	My company's executives recommend using the software for my job-related tasks.
Implicit social influence	ISI1	My colleagues are frequently using the software for their job-related tasks.
	ISI2	My coworkers are frequently using the software for their job-related tasks.
	ISI3	My supervisor is frequently using the software for his or her job-related tasks.
	ISI4	My subordinates are frequently using the software for their job-related tasks.
	ISI5	My company's executives are frequently using the software for their job-related tasks.

Appendix A *Continued*

Constructs	*Item*	*Measure*
IT utilization		
	UT1	Daily usage hours (1. rarely, 2. less than 30 mins, 3.30 mins to 1 h, 4.1–2 h, 5. 2–3 h, 6. more than 3 h)
	UT2	Frequency of utilization (1. less frequent than once a month, 2. once a month, 3. several times a month, 4. several times a week, 5. once a day, 6. several times a day)
	UT3	I am dependent upon the use of this software for performing my job-related tasks.
	UT4	I am more dependent upon this software than other softwares which have similar functions.
	UT5	I am more dependent upon this software than other technology devices which have similar functions (such as typewriters, fax machines, etc.).
User satisfaction	US1	By using the software, I can make the precise information for performing my job-related tasks.
	US2	By using the software, my information needs can be met.
	US3	By using the software, sufficient information for performing my job-related tasks can be provided.
	US4	By using the software, accurate information for performing my job-related tasks can be provided.
	US5	I am satisfied with the accuracy of the software.
	US6	Overall, I am satisfied with the software for performing my job-related tasks.

[a]The instructions to the respondents were: 'Please select the most frequently used word processing software or CMCS and print the name of the software. We wish to determine how useful you believe the software could be for your job-related responsibilities. Please circle a score from the scale 1 to 7 (7-point Likert-type scale except DUT and FUT, from 1. strongly disagree to 7. strongly agree) which most closely corresponds with how you perceive with each of the following statements.