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Changki Kim
Rensselaer Polytechnic Institute

Jung Joo Jahng
Rensselaer Polytechnic Institute

Jinjoo Lee
Korea Advanced Institute of Science and Technology

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Changki Kim
Lally School of Management & Technology
Rensselaer Polytechnic Institute
kimc5@rpi.edu

Jungjoo Jahng
Lally School of Management & Technology
Rensselaer Polytechnic Institute
jahngj@rpi.edu

Jinjoo Lee
Graduate School of Management
Korea Advanced Institute of Science and Technology
pearllee@kgsm.kaist.ac.kr

ABSTRACT

In an attempt to provide a causal model for Information Technology (IT) acceptance, this research integrates task-technology fit and social influence perspectives. This research model includes simultaneously IT acceptance variables, antecedents of IT acceptance, and its impact on individual performance. The implicit assumption between IT acceptance and its positive impact is empirically tested. A field study was undertaken to test the causal relationships via structural equation modeling using LISREL. Data were collected from word-processing software users and computer-mediated communication systems (CMCS) users in large business organizations. The task-fit model, the social influence model, and the integrated model all performed well in terms of goodness-of-fit. Overall, the integrated model provided the best explanatory power and goodness-of-fit. Not only the paths between utilization and user satisfaction but also the paths from each of these to individual impact were significant. In addition, the paths from task-fit and the reference group's utilization to utilization were significant as well. On the other hand, the reference group's suggestion, one of the social influence variables, had no significant influence on utilization. Implications and future research directions on IT acceptance are drawn.

Keywords

Information Technology Acceptance; Task-Technology Fit; Social Influence Perspective; Reference Group Theory

INTRODUCTION

As IT becomes one of the most important strategic business tools, larger investments are being made. While IS researchers have been focusing more on IT acceptance rather than IS success, IS practitioners have been especially interested in investigating the impact of IT acceptance on IS success in terms of organizational or individual performance. The Technology Acceptance Model (TAM) (Davis 1989, Davis, Bagozzi, and Warshaw 1989) and other IT acceptance models have made significant contributions to explaining and modeling IT acceptance. However, little research has been done on the link between IT acceptance and organizational or individual performance (Venkatesh, Morris, Davis, and Davis 2003). The first purpose of this study is to test the implicit assumption that IT acceptance will result in positive performance.

It is difficult to identify and examine the whole IT acceptance process and the translation process into organizational and individual performance. Although there have been several streams of IT acceptance research, little research have included antecedent and consequent variables of IT acceptance at the same time. The second purpose of this study is to develop a causal chain model that includes antecedent variables, IT acceptance variables and its consequent variables.

The current mainstream of IT acceptance and IS success research is focused on individual factors rather than social factors. As new technology has been evolving quickly, many new systems have been produced, giving IT users more alternatives. Based on individual factors, such as the fit between tasks and IT, perceptions of usefulness and ease of use, users are inclined to rationally choose the best alternative or alternatives. In addition, users' reference group members, such as coworkers and supervisors, might suggest a certain alternative with positive evaluation or they might mandate using an alternative while explaining its necessity. Most of users have a chance to communicate and cooperate with other organization members through using certain systems that they may not be familiar with. Thus, social influence is also important in IT acceptance research. It is one of our objectives to identify significant social influence variables.

Legris, Ingham, and Collerette (2003) pointed out the limitations of involving students in IT acceptance researches, and they suggested that further research should be done in a business environment. This study tests a model in a business environment to help IS practitioners to effectively manage IT acceptance and implementation.

THEORETICAL BACKGROUND AND MODEL DEVELOPMENT

Task-Fit and IT Acceptance

The information processing model in organizational behavior research has attempted to describe how organizations can match information processing requirements arising from a task to information processing capacity arising from organizational design and structure in order to achieve high organizational performance (Daft and Lengel 1986; Galbraith 1977; Keller 1994; Tushman and Nadler 1978). Empirical research has supported the relationship between fit and performance, with fit conceptualized as the match between task and information processing capacity (Keller 1994).

Task-fit is defined as the extent to which users believe that using IT can match computing needs from job-related tasks. Not only "perceived usefulness" and "ease-of-use" in TAM but also task-fit are rational choice criteria which are influential on IT acceptance. Task-fit can be positively correlated with the TAM's "perceived usefulness" construct defined as the extent to which using IT will increase his or her job performance. It is obvious that "ease-of-use," defined as the extent to which a person believes that using IT will be free of effort, is a useful construct for explaining IT acceptance. However, task-fit is more crucial and fundamental requirement than the other two constructs. If IS or IT does not suit someone's task, it will not be utilized whether it is a useful and ease-of-use system or not. That's more likely to be true in a working environment. Task-fit concept focuses on the fit between task and IT, whereas "perceived usefulness" and "ease-of-use" focus on users' perception on IT.

Thompson, Higgins, and Howell (1991) found the positive significant relationship between job fit and PC utilization, while defining job fit as "the extent to which an individual believes that using a PC can enhance the performance of his or her job." The positive relationship between task-fit and utilization has been supported in several research papers (Cooper and Zmud 1990, Goodhue 1988, Goodhue and Thompson 1995). Goodhue and Thompson (1995) suggested "performance impact" would be influenced by "utilization" and "task-technology fit." Their results showed that "performance impact" was explained better by "utilization" than by "task-technology fit." However, if IT is not utilized, task-technology fit would not result in performance impact. So, the effects of task-technology fit on performance impact are mediated by utilization.

Hypothesis 1. Task-fit will have a significant positive influence on utilization.

Social Influence and IT Acceptance

Social information processing theory proposed that acquiring a belief, developing an attitude, and making a decision can be influenced by their co-workers (Salancik & Pfeffer 1978). Shibutani (1955) described the concept of reference group as follows: "(1) groups which serve as comparison points; (2) groups to which men aspire; and (3) groups whose perspectives are assumed by the actor." Reference group members, such as colleagues, coworkers, and boss, can be influential in deciding IT acceptance.

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, Agarwal, and Sambamurthy (2003) also found that perceived social influence from referent others had no significant influence on individual beliefs about usefulness.

After new information technology is introduced into an organization, users familiarize themselves with its good and bad features. As they use a new technology, they sometimes communicate with coworkers and managers about their experience using it. If they regard coworkers and managers as their reference group, a group member's positive evaluation on a certain technology will positively influence a user's IT acceptance.

According to social learning theory (Bandura 1986), observational learning occurs by users observation of other individuals' behavior. That will have a significant influence on utilization. The information from the one who is regarded as important referent person will have a significant impact on the recipient's utilization behavior. This study proposes that a reference group's suggestion and utilization will be significant sources of IT acceptance.

Hypothesis 2. Reference group's suggestion will have a significant positive influence on utilization.

Hypothesis 3. Reference group's utilization will have a significant positive influence on utilization.

IT Acceptance and Its Impact on Individual Performance

IS success can be defined as the extent to which an IS contributes to organizations or users achieving their goals (Kim 1990). This definition is helpful to both IS researchers and practitioners. However, it is difficult to measure because it includes some intangible concepts. The difficulties in isolating the net effect of the IS from other effects cause researchers to develop surrogate measures which are easier to measure (DeLone and McLean 1992). Among various measures, utilization and user satisfaction are the most widely selected measures of IS success (Amoroso and Cheney 1991; Schiffman, Meile, and Igbaria 1992). And they are also generally accepted measures of IT acceptance. DeLone & McLean (1992, 2003) proposed a comprehensive and multidimensional model of IS success, which include system quality, information quality, use, user satisfaction, individual impact, and organizational impact. In this study, utilization and user satisfaction are selected as IT acceptance indicators and individual impact is selected as the consequence of IT acceptance.

The relationship between utilization and user satisfaction has not been consistently reported in empirical results. While Ginzberg (1981) and Sanders (1984) found that there were low correlations, and in some cases no correlations at all, Robey (1979), Baroudi, Olson, and Ives (1986), and Igbaria and Nachman (1990) found a strong relationship between them. Schewe (1976) and Srinivasan (1985) found no significant relationship between user attitudes and utilization. Srinivasan (1985) concluded that a strong relationship between the two constructs may not always exist. We assume that utilization and user satisfaction will have significant positive influences on each other. As users gain experience with a certain system, they tend to become more familiar with it and discover good features which enhance their work performances. The more they use it, the more likely it is that they will be satisfied with it. Conversely, the more satisfied users are, the more likely it is that they will utilize the system.

Hypothesis 4. Utilization and user satisfaction will influence each other significantly and positively.

Utilization and user satisfaction are good surrogate measures which have been assumed to translate into improved organizational or individual effectiveness. However, the implicit assumption needs to be examined. As DeLone and McLean (1992) proposed, there are more ultimate variables, such as individual impact and organizational impact, which should be considered. At the level of individual user, individual impact can be defined as the net contribution of using IT in a working environment. It is closely related to improving performance, a better understanding of the decision context, and improving decision-making productivity (DeLone & McLean 1992). According to their recently updated research, DeLone & McLean (2003) found that most of the empirical studies, which tested the relationships between utilization and individual impact and between user satisfaction and individual impact, supported those relationships.

Hypothesis 5. Utilization will have a significant positive influence on individual impact.

Hypothesis 6. User satisfaction will have a significant positive influence on individual impact.

RESEARCH MODELS

This study is focused on developing a causal structure model rather than bivariate relationships. For that purpose, structural equation modeling (SEM) is conducted in order to establish causal relationships among IT acceptance variables, their antecedent and consequent variables.

As discussed, task-fit, reference group's suggestion, and reference group's utilization will have a significant influence on utilization. However, these three factors will not directly influence user satisfaction and individual impact. Utilization will directly influence both user satisfaction and individual impact. And user satisfaction will have a significant influence on utilization and individual impact. All these causal relationships constitute the integrated model. The task-system fit model excludes reference group's suggestion and reference group's utilization, while the social influence model excludes task-system fit. Figure 1 presents the hypotheses and the integrated model.

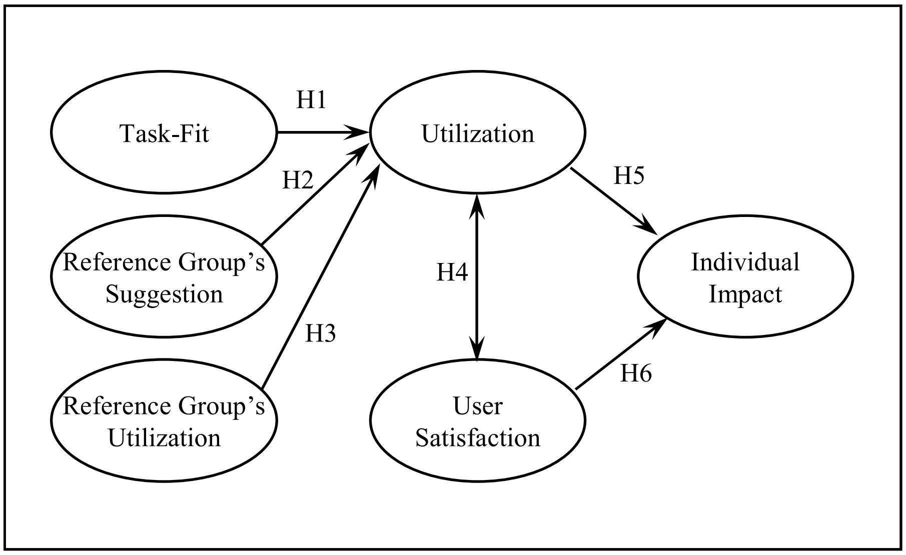


Figure 1. Integrated Model and Hypotheses

METHODS

Sample and Procedure

The preliminary survey instrument was distributed to only business-organization sponsored MBA students for refining instrument and selecting important IT application areas in business organizations. According to their responses, we could identify that word-processing and CMCS are the most important and widely adopted IT applications. Based on their feedback concerning clarity of meaning and enhancement of readability, the questionnaire was slightly modified. Data were collected through the survey from IT users of fifteen large-sized organizations in Korea. A total of 421 questionnaires (210 word processing users and 211 CMCS users) were distributed and a total of 262 questionnaires (136 word processing users and 126 CMCS users) were returned. The response rates were 64.8% and 59.7%, respectively, from word processing software and CMCS users. Table 1 shows the respondents' distribution of industries and departments.

Industry	# of Respondents	%	Department	# of Respondents	%
1. Machinery	35	13.4%	1. Accounting, Finance	16	6.1%
2. Electronic	16	6.1%	2. Strategic Planning	36	13.7%
3. Auto Parts	16	6.1%	3. Marketing	34	13.0%
4. Semiconductor	16	6.1%	4. R&D Management	37	14.1%
5. Cement	12	4.6%	5. General Affairs	2	0.8%
6. Other Manufacturing	14	5.3%	6. R&D	59	22.5%
7. Trading and Wholesale	53	20.2%	7. International Affairs	2	0.8%
8. Telecommunications	46	17.6%	8. Human Resources	3	1.1%
9. Other Services	54	20.6%	9. Others	55	21.0%
Missing	-	-	Missing	18	6.9%
Total	262	100%	Total	262	100%
Age	# of Respondents	%	Education	# of Respondents	%
1. under 25	50	19.1%	1. High school	23	8.8%
2. 26 - 30	132	50.4%	2. Undergraduate	113	43.1%
3. 31 – 35	63	24.0%	3. Graduate	125	47.7%
4. over 36	16	6.1%	Missing	1	0.4%
Missing	1	0.6%			
Total	262	100%	Total	262	100%
Gender	# of Respondents	%	Work Experience in Current Department		
1. Male	208	79.4%	Mean	30.8	months
2. Female	54	20.6%	S.D.	29.5	months
Total	262	100%			

Table 1. Sample Profile

Measures

In this paper, relevant measures were collected from the previous research, as shown in Table 2, and adapted to our research context. Cronbach's alpha for the multiple-item scales are presented in Table 2. All alpha scores are above the recommended 0.80 minimum level (Carmines and Zeller 1979).

Table 3 provides the factor pattern matrix. Each item is loaded more highly on its associated construct than on any other construct.

Constructs	Related Research	Number of Items	Cronbach's α
Task-fit	Thompson et al. (1991)	5	.908
Reference Group's Suggestion	Fulk (1993)	5	.906
Reference Group's Utilization	Fulk (1993) Thompson et al. (1991)	5	.871
Utilization - Daily Usage Hours - Frequency - Dependency	 Ein-Dor & Segev (1991), Ghani (1992), Igbaria (1990) Igbaria (1990), Thompson et al. (1991) Goodhue & Thompson (1995) Schiffman et al. (1992)	 1 1 3	 N.A. N.A. .757
User Satisfaction	Doll and Torkzadeh (1988)	10	.943
Individual Impact	Hughes (1987) Millman and Hartwick (1987) Rivard and Huff (1984) Rivard and Huff (1985) Sanders and Courtney (1985)	6	.939

Table 2. Related Research and Reliability of Measures

Constructs	Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Task-Fit	TFIT1	0.78	0.07	0.14	0.13	0.19	0.18
	TFIT2	0.74	0.04	0.07	0.19	0.20	0.17
	TFIT3	0.83	0.13	0.11	0.18	0.17	0.26
	TFIT4	0.63	0.11	-0.01	0.15	0.29	0.33
	TFIT5	0.83	0.11	0.14	0.14	0.11	0.19
Reference	RGSG1	0.05	0.76	0.18	0.06	0.20	0.03
Group's	RGSG2	0.27	0.75	0.29	0.02	0.15	0.11
Suggestion	RGSG3	0.15	0.86	0.20	0.10	0.04	0.05
	RGSG4	0.19	0.77	0.25	-0.08	0.14	0.11
	RGSG5	-0.10	0.84	0.14	0.10	0.02	0.05
Reference	RGUT1	0.09	0.22	0.73	0.22	0.19	0.05
Group's	RGUT2	0.23	0.28	0.79	0.13	0.07	0.13
Utilization	RGUT3	0.16	0.44	0.66	0.20	0.03	0.10
	RGUT4	0.17	0.27	0.74	0.05	0.07	0.16
	RGUT5	-0.13	0.44	0.54	0.19	0.06	0.17
Utilization	DUT	0.18	0.06	0.13	0.79	0.12	0.11
	FUT	0.08	0.03	0.09	0.76	0.16	0.26
	DEP1	0.38	0.08	0.17	0.66	0.26	0.11
	DEP2	0.12	0.12	0.11	0.59	0.27	0.10
	DEP3	0.41	-0.02	0.29	0.54	0.23	-0.05
User	UIS01	0.20	-0.03	0.06	0.13	0.79	0.20
Satisfaction	UIS02	0.19	-0.06	0.05	0.09	0.78	0.23

	UIS03	0.13	0.15	0.05	0.10	0.83	0.09
	UIS04	0.11	0.15	0.03	0.15	0.74	0.33
	UIS05	0.08	0.14	0.05	0.09	0.82	0.19
	UIS06	0.11	0.11	0.06	0.18	0.82	0.16
	UIS07	0.09	0.18	0.13	0.22	0.74	0.00
	UIS08	0.10	0.11	-0.05	0.10	0.82	0.13
	UIS09	0.17	-0.01	0.22	0.09	0.65	0.36
	UIS10	0.28	-0.03	0.24	0.12	0.60	0.32
Individual	IMPT1	0.19	0.07	0.15	0.12	0.28	0.83
Impact	IMPT2	0.23	0.03	0.12	0.13	0.31	0.82
	IMPT3	0.18	0.09	0.04	0.17	0.40	0.77
	IMPT4	0.22	0.12	0.07	0.08	0.31	0.74
	IMPT5	0.52	0.17	0.16	0.16	0.20	0.62
	IMPT6	0.48	0.17	0.22	0.15	0.18	0.63
Eigenvalue		4.49	4.08	3.13	2.86	6.89	4.30
Percent of Variance		12.48	11.33	8.69	7.94	19.15	11.95

Table 3. Results of Factor Analysis

RESULTS

Means, standard deviations, and other descriptive statistics for the variables studied are reported in Table 4.

Table 5 provides correlation coefficients for variables studied.

Variables	Abbreviation	Mean	S.D.	Min.	Max.
Task-fit	TFIT_X1	4.85	1.01	1.50	7.00
Reference Group's Suggestion	RGSG_X2	4.27	1.35	1.00	7.00
Reference Group's Utilization	RGUT_X3	4.67	1.27	1.17	7.00
Utilization					
Daily Usage Hours	DUT_Y1	3.82	1.38	1.00	6.00
Frequency	FUT_Y2	5.28	1.02	1.00	6.00
Dependency	DEP_Y3	5.27	1.35	1.00	7.00
User Satisfaction	UIS_Y4	4.76	0.90	1.92	7.00
Individual Impact	IMPT_Y5	4.57	1.04	1.00	7.00

Table 4. Descriptive Statistics for Variables Studied

Variables		(TFIT)	(RGSG)	(RGUT)	(DUT)	(FUT)	(DEP)	(UIS)	(IMPT)
Task-fit	(TFIT)	1.000							
RG's Suggestion	(RGSG)	.289***	1.000						
RG's Utilization	(RGUT)	.367***	.612***	1.000					
Daily Usage Hours	(DUT)	.338***	.165***	.300***	1.000				
Frequency	(FUT)	.329***	.164***	.271***	.595***	1.000			
Dependency	(DEP)	.524***	.268***	.433***	.570***	.556***	1.000		
User Satisfaction	(UIS)	.475***	.266***	.332***	.256***	.350***	.467***	1.000	
Individual Impact	(IMPT)	.632***	.293***	.387***	.303***	.380***	.464***	.645***	1.000

Table 5. Correlation Coefficients for Variables Studied

As mentioned earlier, SEM was used to develop a causal model. SEM includes two main parts – a structural and a measurement model. The structural model has the following three formulas.

$$\eta_{UTIL} = \gamma_{11}\xi_{TFIT} + \gamma_{12}\xi_{RGSG} + \gamma_{13}\xi_{RGUT} + \beta_{12}\eta_{UIS} + \zeta_1$$

$$\eta_{UIS} = \beta_{21}\eta_{UTIL} + \zeta_2$$

$$\eta_{IMPT} = \beta_{31}\eta_{UTIL} + \beta_{32}\eta_{UIS} + \zeta_3$$

The measurement model considers the adequacy of the measures for the theoretical constructs employed in the study. The measurement model has the following eight formulas.

$$TFIT\_X1 = \lambda^x_{11}\xi_{TFIT} + \delta_1$$

$$RGSG\_X2 = \lambda^x_{22}\xi_{RGSG} + \delta_2$$

$$RGUT\_X3 = \lambda^x_{33}\xi_{RGUT} + \delta_3$$

$$DUT\_Y1 = \lambda^y_{11}\eta_{UTIL} + \varepsilon_1$$

$$FUT\_Y2 = \lambda^y_{21}\eta_{UTIL} + \varepsilon_2$$

$$DEP\_Y3 = \lambda^y_{31}\eta_{UTIL} + \varepsilon_3$$

$$UIS\_Y4 = \lambda^y_{42}\eta_{UIS} + \varepsilon_4$$

$$IMPT\_Y5 = \lambda^y_{53}\eta_{IMPT} + \varepsilon_5$$

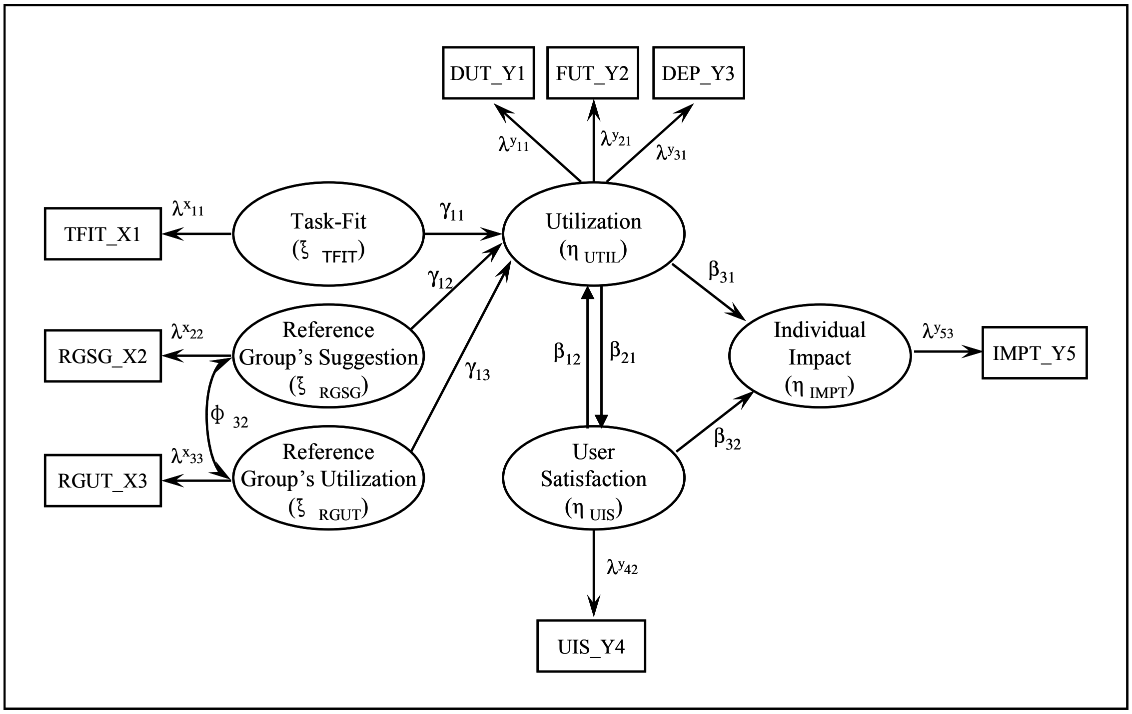


Figure 2. Structural Equation Model

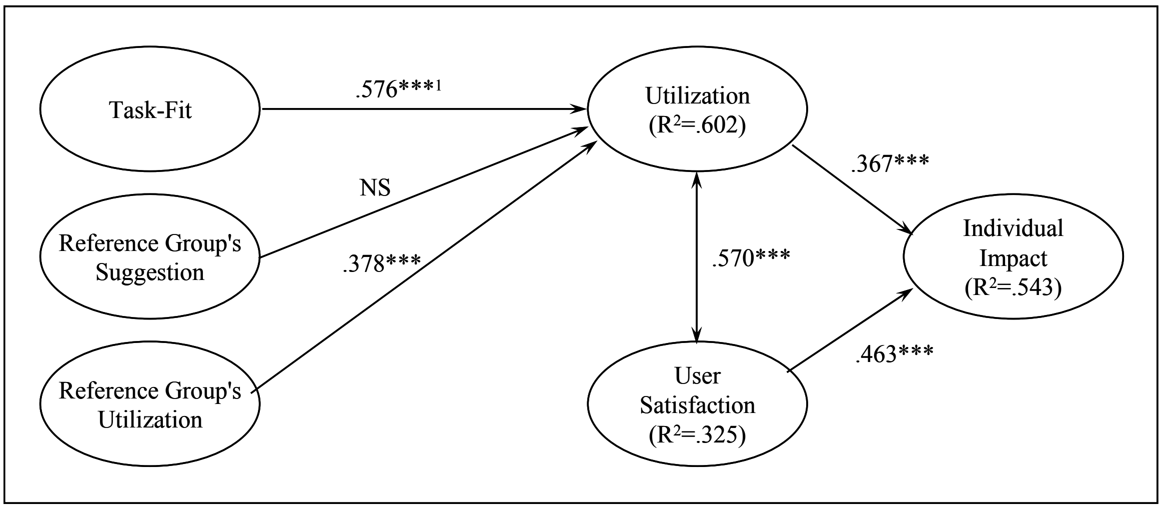
This study compares three models by SEM using LISREL. As mentioned, the task-fit model excludes reference group's suggestion and reference group's utilization. And the social influence model excludes task-fit. The overall goodness-of-fit was evaluated on the basis of six measures: chi-square statistics, goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), normed fit index (NFI), non-normed fit index (NNFI), and root mean square error of approximation (RMSEA). The explanatory power was examined by R^2 of utilization, user satisfaction, and individual impact.

As summarized in Table 6, these three models show good fits and most of the indices exceed acceptance levels commonly suggested by previous research (Chin and Newsted 1995; Silvia 1988; Taylor and Todd 1995; Bentler and Bonett 1980). In terms of explanatory power, the integrated model outperforms the other two models. The r-square of sytem utilization is 0.602 in the integrated model while below 0.5 in the other two models. The r-squares of user satisfaction and individual impact in the integrated model are slightly greater than those of other models.

Statistics		Recommended Value	Integrated Model	Task-fit Model	Social Influence Model
Goodness of Fit	χ^2		60.664^{***}	52.966^{***}	16.163
	p value	>= 0.05	p < .001	p < .001	p = .184
	GFI	>= 0.9	.944	.936	.983
	AGFI	>= 0.8	.874	.832	.959
	NFI	>= 0.9	.920	.909	.973
	NNFI	>= 0.9	.893	.851	.988
	RMSEA	<= 0.1	.106	.150	.037
Explanatory Power	$R^2_{Utilization}$	n.a.	.602	.487	.309
	$R^2_{User\ Satisfaction}$		.325	.323	.290
	$R^2_{Individual\ Impact}$		.543	.533	.507

Table 6. Comparison of Three Models

In terms of significance and direction, all coefficients in the three models show consistent results. The estimated path coefficients for the integrated model are reported in Figure 3. Path coefficient from Task-fit to utilization is positively significant. Path coefficient from reference group's utilization to utilization is positively significant as well, while path coefficient from reference group's suggestion to utilization is not significant. The relationships among IT acceptance and individual impact are all positively significant. The results of SEM support hypotheses 1, 3, 4, 5, and 6 while not supporting hypothesis 2. The insignificant influence of reference group's suggestion means that suggestion has little to no impact on user's IT acceptance until users see their reference group's actual utilization.



[1] Standardized Path Coefficient, NS = not significant; *** p < .001

Figure 3. Comparison of Three Models

CONCLUSION

This study tested the causal relationships and three models which include IT acceptance, its consequent variable, and its antecedents at the individual user level. From the social influence perspective, reference group's suggestion had no significant influence on utilization, but reference group's utilization had a significant positive influence on utilization. From the task-fit perspective, task-fit had also a significant positive influence on utilization and explained more of the variance of utilization than social influence variables did. Integrating these two perspectives gave us better goodness-of-fit and explanatory power.

Future research would extend this research by adding more social influence constructs and by exploring other possible significant variables which would influence IT acceptance and individual impact.

It may also be important to explore other contingent variables, perhaps including user's IT experience and voluntariness of system use, etc.

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