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ABSTRACT

User participation is an important construct in IS research. It is also a frequently employed practical implementation strategy. However, research findings concerning the effects of user participation on system success are mixed and inconclusive.

This study reviews a contingency theory of attitude change, proposes competing models, and empirically tests the models in end-user computing involving multiple end-user groups. Results lend support to the Cognition Fit Model. Other models receive only partial support.

1. INTRODUCTION

Among the approaches to assessing the success of computers and the information systems (IS) function, user satisfaction has received the greatest attention from researchers (Melone 1990; Goodhue 1988). However, recent reviews of research on user satisfaction are mixed and inconclusive (Ives and Olson 1984; Goodhue 1988). This lack of convergence in user satisfaction research may be due to the over-simplified assumption underlying most such research - that only an intervention, such as the introduction of a computer-based information system (CBIS), causes impacts on users to occur. It is more plausible that the *interaction* among the organization, individuals, and the intervention determines the impact on users (Nelson 1990; Markus and Robey 1988; Markus 1983). However, this approach lacks both theoretical and empirical support. This study attempts to bridge this gap.

User participation is also a commonly-used approach to facilitate communication and decision making in information systems development activities. However, most studies on user participation lack a sound theoretical basis and display methodological and measurement problems (Ives and Olson 1984). Consequently, in spite of the considerable effort given to the study of user participation, the IS field has been left with a weak understanding of user participation and its role in the system development process (Barki and Hartwick 1990).

The primary purpose of this study is to explore the contingencies under which user participation in systems development activities influences system success. Specifically, this study reviews four categories of models related to the success of computer systems and uses a survey sample of end-users and IS professionals to test hypotheses related to the models.

2. A CONTINGENCY PERSPECTIVE OF INDIVIDUAL COMPUTING IMPACT

Figure 1 summarizes and contrasts various computing impact models at the individual level. "Impact" refers to both intentional outcomes, such as system quality or acceptance, and unintended outcomes, such as job content changes. The grid classifies models based on their underlying assumptions about the influence of the user and the working context. These assumptions are reflected in the variables and unit of analysis that researchers choose to study. Four groups of computing impact models are shown in Figure 1. These are (1) the Simple Model, (2) the Cognition- or Motivation-Based Model (3) the Context-Based Model and (4) the Integrated Model.

2.1 The Simple Individual Computing Impact Model

In this model, shown in the upper-left of Figure 1, the characteristics of the individual user and the computing context are fixed or unrelated to the computing impact. For example, Ives and Olson (1984) examined studies on the relationships between user participation and system quality or acceptance and found these relationships to be weak or inconclusive. They indicated that one of the potential causes of these results is the neglect of underlying cognitive and motivational factors which may account for the observed outcomes.

2.2 The Cognition- or Motivation-Based Individual Computing Impact Model

In this model, shown in the upper-right of Figure 1, individual difference in terms of psychological states are

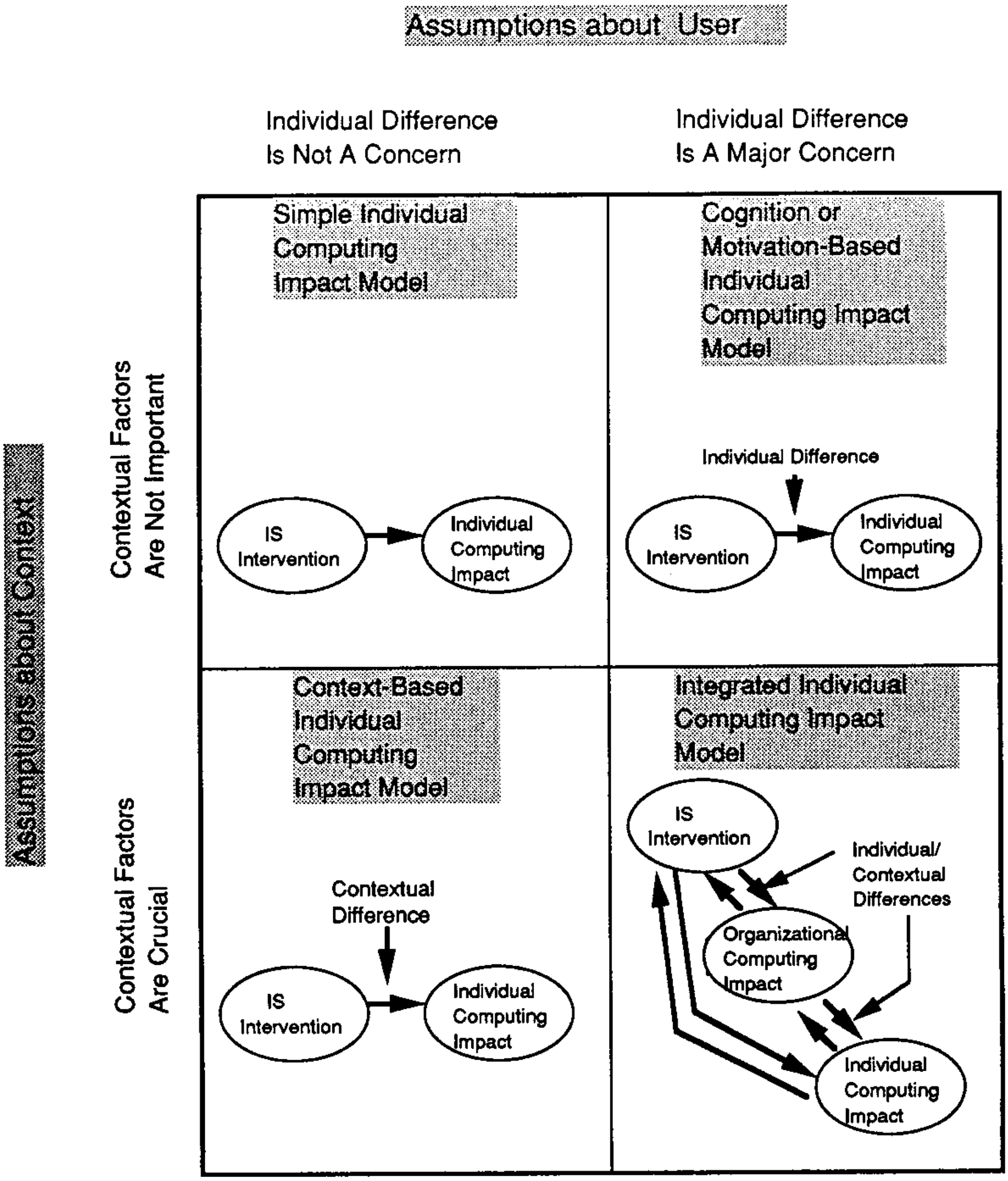

Figure 1. A Comparison of Individual Computing Impact Models

studied as factors which may moderate relationships of computing efforts and their impacts on individuals. The effects of the user's contexts are not studied. For example, Doll and Torkzadeh (1989) studied the relationship between end-user participation in development activities and user satisfaction under different situations taking users' levels of expectation (i.e., desired participation) as a frame of reference.

2.3 The Context-Based Individual Computing Impact Model

In this model, shown in the lower left of Figure 1, contextual factors are hypothesized to have significant influence on the relationship between computing efforts and impacts on individuals. Individual differences are not a primary concern. For example, Kim (1990a) examined the relationship between user participation and user satisfaction under various development situations and found that extensive user participation is more desirable under some situations.

2.4 The Integrated Individual Computing Impact Model

A much broader and more plausible perspective than is offered by any of the above models involves viewing the individual and the organization as adjusting to each other for mutual benefit (Barnard 1938; March and Simon 1958; Staw 1977). In this perspective, computing impacts are not merely a technical change, but also trigger significant social changes (Nelson 1990).

This model, shown in the lower-right in Figure 1, recognizes that while computing impacts on an individual's work setting (categorized as an organizational computing impact in Figure 1) are inevitable, their effects may be either positive, negative, mixed or insignificant. In explaining the mixed effects that have been found on user satisfaction, most past research has failed to include factors such as the impacts on work settings.

3. THE THEORETICAL BASES FOR THE STUDY

Based on the contingency perspective of individual computing impacts, this study examines the Simple Individual Computing Impact Model and the Cognition- or Motivation-Based Individual Computing Model.

Doll and Torkzadeh (1989) indicated that individual differences in desire or motivation for participation may be particularly important in an end-user computing (EUC) environment in which users interact directly with computer applications. Therefore, to operationalize these models, this study specifically examines the role of individual differences, as contingency variables, in the relationship between user participation (i.e., one type of intervention in Figure 1) and user satisfaction (i.e., one outcome variable of individual computing impact in Figure 1) in the EUC context. Research in participative decision making and attitude change theory were identified as relevant.

3.1 Participative Decision Making Research

Most IS research conceptualizes user participation in development activities as a special case of participative decision making involving users and analysts instead of superiors and employees (Ives and Olson 1984). Doll and Torkzadeh (1989) indicated that, in the EUC context, the concept of user participation is no longer a two-party relationship, as in the traditional data processing environment, but "sharing" in decision making. User participation has been conceptualized as the relative influence of analyst versus user in a traditional IS environment (Franz and Robey 1986). In EUC, end-users perform some of the analysis activities that were traditionally performed by systems analysts.

Doll and Torkzadeh (1989) further suggested the study of "why" individual users participate. According to Locke and Schweiger (1979), the psychological mechanisms – cognition, motivation and value attainment – that link participation to satisfaction are determinants of satisfaction. Through cognitive mechanisms, participation by users may enhance productivity or system quality through improved communication or better understanding. Motivation mechanisms reduce users' resistance to change and enhance users' acceptance or commitment to changes. The effects of participation are a function of an individual's attainment of his or her values.

The effects of participation are moderated by several contextual variables. According to Doll and Torkzadeh (1989), participation is more effective when individuals desire participation, have relevant skills and information, perceive that their participation will affect the outcomes, feel their participation is legitimate, and experience little status or expertise differential.

3.2 Attitude and Attitude Change Theory

The well-known "user satisfaction" construct has poorly developed theoretical foundations (Goodhue 1988). For example, Ives and Olson indicated that the underlying cognitive and motivational factors that may account for why user participation may lead to user satisfaction are not explored. Further, a variety of terms are associated with user satisfaction: system acceptance, perceived usefulness, MIS appreciation, feelings, perceptions and beliefs (Swanson 1982). Melone suggested IS researchers adopt a broader and well-developed construct (user attitude) to study user satisfaction. This suggests that theories of attitude and attitude change may be helpful in explaining user satisfaction.

Davis, Bagozzi and Warshaw (1989) synthesized IS research on users' attitudes toward their use of computer applications in a technology acceptance model. In this model, user attitudes are influenced by various external factors such as the system's technical design characteristics, user participation in system development, the type of system development process used, the nature of the implementation process used and cognitive style. However, empirical research findings are mixed and inconclusive. Therefore, to better understand why user's attitudes may change after using computer applications, they suggest another model that is based on the attitude change theory: Reasoned-Action Theory (Fishbein and Ajzen, 1975).

Locke's model of how and why job satisfaction changes over time thereby appears to be useful in this regard. Locke (1984) proposed a general framework – psychological architecture – to look at intervening variables, mediating processes, and the causality of forming user's satisfaction. In Locke's model, satisfaction is defined as emotional response or affect toward an object. An object is anything that can be perceived or conceived, e.g., an action, a situation, or a computer application. Kim (1990b) found that existing user satisfaction measures cover a wide range of different objects, including input, processing, product, support, organizational factors, and MIS effectiveness. The value appraisal stage of Locke's model provides the basis for a person to value his or her cognition of the objects. Differing emotions then become the result of these value appraisals.

> If the situation is perceived as furthering or facilitating the attainment of one's values, then a positive emotion is experienced. If the situation is perceived as threatening, blocking, or destroying one's values, then a negative emotion is experienced. (Locke 1984, p.98)

This discrepancy model is similar to what Doll and Torkzadeh (1989) and Kim (1990b) used in their studies of user satisfaction. Locke further indicated that the amount of affect will depend not only on the degree of value attainment or loss but also on value importance. For example, for high-valued objects, the results of value assessment, based on an individual's expectation, may be more positive for that of meeting the expectation and negative for that of not meeting the expectation.

Locke's model also assumes that an individual's perceptions or cognitive processes are the basis or prerequisites of attitude changes. Therefore, persuasive messages from situational cues or individual perceptions of changes in working contexts may account for the input of attitude changes. Attitude not only may be affected by an external message but also by the results of one's own thought or internal drives. According Petty and Cacioppo (1981), mere thinking can polarize one's attitude toward certain objects. These self-generated, cognitive responses (thoughts) may agree or disagree with, or may be deemed as irrelevant to, the external messages. The implication is that individual difference may confound the effects of persuasive communication. This may explain why both positive and negative effects have appeared in the IS literature. Consequently, in the EUC context, individual differences and contextual factors may jointly determine the outcomes of the implementation efforts.

4. THE EMPIRICAL STUDY

This section discusses the variables and the relationships hypothesized in this study to assess the influence of user participation and user involvement on user satisfaction.

4.1 Variables and Their Operationalizations

User Satisfaction - Of the many surrogates of IS *success*, user satisfaction has received the greatest attention from IS researchers (Goodhue 1988). This study adopts the Doll and Torkzadeh (1988) definition and instrument of End-User Computing Satisfaction (EUCS). EUCS is the affective attitude toward a specific computer application by someone who interact with the application directly. The instrument developed by Doll and Torkzadeh measures affective attitudes with information generated from an application and ease-of-use of the system. Among the thirteen items in the Likert scale, several word changes such as application, information and system were made in order to clarify attitude objects for end-users in a consistent manner.

User Involvement - The term "user involvement" implies a subjective psychological state as suggested by Barki and Hartwick (1989). A user is involved when he/she considers a system to be both important and personally relevant. While this definition departs from past IS research (e.g. Baroudi, Olson and Ives 1986; Franz and Robey 1986), it is more consistent with the conceptualization of the involvement construct developed in other disciplines. The instrument used is that of Zaichkowsky (1985) which measures the personal relevance or importance of an object. The object is a specific *computer application* which was identified by each respondent. Twenty-seven-point bi-polar semantic differential items were used.

User Participation - In the EUC context, factors such as (1) less restrictive participation arrangements, (2) the ability, through end-user development tools, to tailor applications in response to individual differences, and (3) constant improvements in end-user skills and expertise: have made user participation differ from that in the traditional IS environment (Doll and Torkzadeh 1989). Therefore, user participation is defined and measured as the extent to which users engage in system development activities.

The Doll and Torkzadeh (1989) instrument measures both the perceived *actual* and *desired* amount of time an end-user participated in the development of a specific computer application. They evaluated and adopted an eight-item instrument, focusing on systems analysis activities (Doll and Torkzadeh 1990). For each item, a five-point Likert scale was used.

4.2 Hypotheses

User participation has long been a focal point in the management of IS implementation. It is important because it often generates persuasive messages from negotiation or communication between management, analysts and users that help shape users' attitudes toward their IS. Based on past research and the emerging EUC context, we hypothesize a positive relationship between user participation and user satisfaction. This hypothesis is based on the Simple Individual Computing Impact Model of Figure 1 and is shown as the top diagram in Figure 2.

H1: User participation in systems development activities is positively associated with EUCS.

Five hypotheses are related to the cognition- or motivation-based individual computing impact model of Figure 1. According to Locke's theory, a general approach to assessing user satisfaction may be to view it as the value of **relevant** or **important** attitudinal objects, assessed by an individual user and based on his/her **frame of reference.**

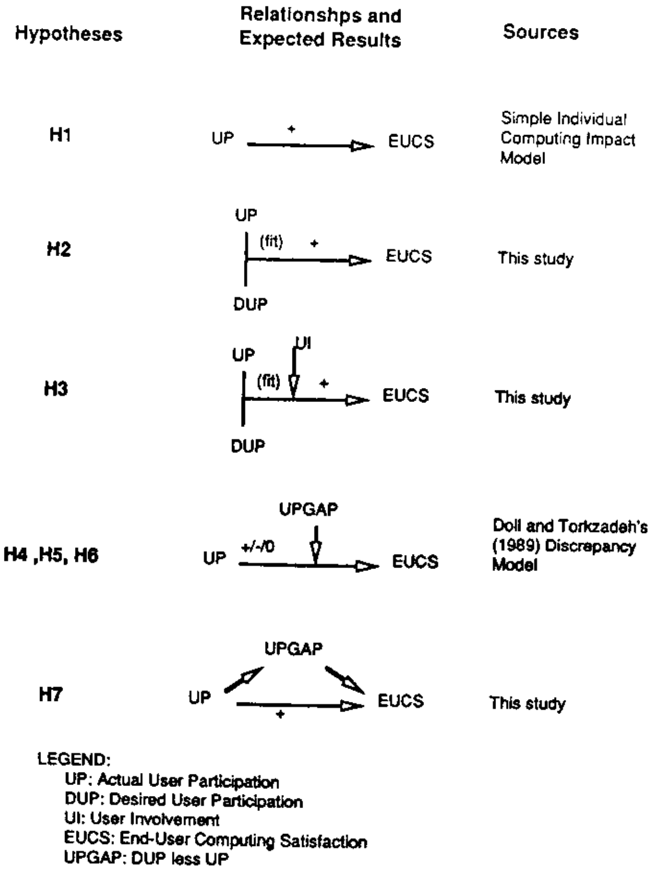

Figure 2. Individual Computing Impacts Models Related to Hypotheses

Miller (1989) has followed Locke's model and tested part of the theory in the computing context. He proposed that it was the individual's perceptions of fit between business needs and IS capabilities that best explained the variance in user satisfaction. Ginzberg (1981) found that a positive effect exists between user's "realism" of pre-implementation expectation (i.e., degree of fit to the average of a group of "expert" users' expectations) and after-implementation user attitudes and system usage. From his study, it seems that a "consensus" among users about how much to participate is more important than each individual's frame of reference. Following Ginzberg's and Miller's ideas of discrepancy or cognition fit, but being consistent with Locke's model, we took a user's desired participation as his/her frame of reference:

H2: EUCS is influenced by the user's belief about the fit between *actual* and *desired* participation in systems development activities.

Locke's framework assumes that a human being is a motivated information processor. It highlights the importance of persuasive messages to attitude changes. In an EUC context, persuasive messages triggering attitude changes may not only come from external sources but also from playing an improvisational role through using or learning to improve a computer application. Individual's cognitive process or frame of reference thus mediates the effects of these messages on satisfaction.

Petty and Cacioppo (1986) indicated that the relationship between messages and satisfaction is complicated and determined by what they called *elaboration likelihood.* The advocacy of a message is influenced by the recipient's ability and motivation to process the information. Individuals who are high on motivation and ability process cues from a "central" route, the carefully constructed arguments in the messages. Individuals who are low in motivation or ability will focus on "peripheral" cues such as a message from an expert and not the arguments. Attitude changes through a central route are hard to achieve but more enduring than those through a peripheral route.

Locke indicated that user satisfaction is not only affected by the value that he/she attained, but is moderated by how important or relevant these values are for users.

For a high-valued or important attitudinal object, the result of the assessment based on expectation is positive for that of meeting the expectation and negative for that of not. For a less-valued object, the result of the assessment may be inconclusive. High involvement means an increase of users' motivation to process issue-relevant information or arguments. Thus, we use user's involvement of using his/her computer application as a substitute of importance or relevance of those values:

H3: The degree of involvement with the computer applications moderates the relationship of H2. Specifically, the more a user is involved in using computer applications, the more his/her belief about the fit between *actual* and *desired* participation in systems development activities is positively associated with user satisfaction.

Researchers and practitioners often assume that desire for increased participation in decision making is equally and widely distributed throughout an organization. Alutto and Belasco (1972) argued that it is more reasonable to assume that one can deal effectively with decisional participation by considering a continuum typified by (1) decisional deprivation – actual participation in fewer decisions than desired, (2) decision equilibrium – actual participation in as many decisions as desired, and (3) decision saturation – actual participation in a greater number of decisions than desired. They use this discrepancy participation concept to study correlates of individual or organizational characteristics and outcomes.

By applying the Discrepancy Participation Theory of Alutto and Belasco to the EUC context, Doll and Torkzadeh (1989) extended the usage and changed the operationalization of the theory. They proposed that user's discrepancy participation may be used to distinguish situations in which the relationship between user's *actual* participation and user satisfaction may be significantly influenced. Under different situations (equilibrium or moderate deprivation, saturation, and high deprivation) one can expect different effects of participation on user satisfaction. They obtained strong effects, as predicted in their theory. This research replicated their study.

H4: Under conditions of equilibrium or moderate deprivation, user participation in systems development activities is positively associated with user satisfaction.

H5: Under conditions of high deprivation, user participation in systems development activities is negatively associated with user satisfaction.

H6: Under conditions of saturation, the association between user participation in systems development activities and user satisfaction is nonsignificant or negative.

Contrasted with the cognition- or motivation-based individual impact model (H2 to H6), it is argued that users' expectations to participate in systems development, i.e., *desired* participation, may be influenced by the results of an system success assessment, if measured in the post implementation period. According to attribution theory (Staw 1975), self-reported data may represent the consequences, rather than the determinants, of performances.

H7: The end-user's value attainment function (defined as DESIRED participation less ACTUAL participation) mediates the relationship between user participation in systems development activities and end-user computing satisfaction.

5. RESEARCH METHODOLOGY

The respondents studied were employees of a large university located in the northeastern United States. Two different groups of respondents were sampled from the university telephone directory. The first group, termed the General User Group, consisted of university faculty, administration and staff. The second group, the CIS Group, was identified as professional staff from the university's computing center.

There are some fundamental differences between these two groups which may result in different relationships among the variables. For example, using computers should be a significant part of an IS professional's job, which is not necessarily the case for the General User. Therefore, we can expect a higher user involvement in the CIS Group than in the General User Group. As a user, an IS professional may possess more expertise and can bargain more easily for computing resources. Furthermore, IS professionals may have more discretion and power or be more motivated to play the participation game.

Questionnaires were mailed to a sample of both groups. A random sample of 696 general users and the entire population of 187 CIS employees were solicited, from which 122 usable responses were received. Among the usable responses, ninety-one belonged to the General User Group (called G1&2), and thirty-one were from the CIS Group (called G3). In addition to these usable responses, five respondents were not computer users, fourteen were no longer employed in the university, and forty-one were returned as undeliverable. The effective response rate was 16.7%.

5.1 Description of the Sample

Over 90% of the respondents used PCs or intelligent terminals. Over 40% used standard PC packages such as wordprocessing, spreadsheet, and dBASE. For the General User Group (G1&2), most were frequent users. Almost all were using either an independent PC (over 60%) or an intelligent terminal or PC connected to other PCs, mini or mainframe computers through networks. Most used computers directly. Self-claimed expertise is evenly distributed, from naive to expert users. One half had college, or above, education. Self descriptions were 58% professional, 19% operational, and 20% managerial. For the CIS Group (G3), three-fourths are frequent and direct users. Most of them (90%) work with either a PC or an intelligent terminal.

An analysis of the demographic characteristics of these two groups revealed no significant differences on attributes such as usage experiences, frequency of usage, degree of directness of usage, education, job nature, and levels of user involvement, satisfaction, actual participation, desired participation, and discrepancy of participation. However, users in G3 possessed more (reached a significant level) expertise for using their computer applications and used more terminal equipment than the users in G1&2.

To check if non-response bias exists, we randomly surveyed, via telephone, a different sample twenty in G1&2 and ten in G3). An analysis of the demographic characteristics of respondents and non-respondents in each group

Table 1. Statistics Related to the Major Variables

General User Group G1&2 (N = 91)

Variables	Cases	Mean	Std. Dev.	Criterion Validity
UI	84	126.21	12.50	N/A
EUCS	81	48.88	7.90	.64**
UP	81	20.89	9.71	.86**
DUP	79	25.66	8.07	.78**
UPGAP	78	4.45	9.35	N/A

	UI	EUCS	UP	DUP	UGAP
UI	(.91)				
EUCS	.28**	(.93)			
UP	.08	.33**	(.95)		
DUP	.29**	-.05	.46**	(.92)	
UGAP	.17	-.37**	-.64**	.39**	(.95)

*P < .05 **P < .01 The numbers in the bracket are reliability coefficients.

CIS Group G3 (N = 31)

Variables	Cases	Mean	Std. Dev.	Criterion Validity
UI	30	123.53	17.11	N/A
EUCS	26	48.21	8.40	.75**
UP	27	20.58	11.00	.95**
DUP	25	26.53	10.21	.96**
UPGAP	25	5.95	7.16	N/A

	UI	EUCS	UP	DUP	UGAP
UI	(.97)				
EUCS	.20	(.93)			
UP	.40*	.10	(.97)		
DUP	.48**	-.25	.83**	(.96)	
UGAP	-.02	-.54**	-.38*	.21	(.95)

*P < .05 **P < .01 The numbers in the bracket are reliability coefficients.

Application User Group G1 (N = 37)

Variables	Cases	Mean	Std. Dev.	Criterion Validity
UI	36	130.59	10.60	N/A
EUCS	34	48.00	9.22	.60**
UP	35	19.88	9.71	.91**
DUP	33	26.84	6.66	.77**
UPGAP	33	6.97	8.94	N/A

	UI	EUCS	UP	DUP	UGAP
UI	(.92)				
EUCS	.33*	(.93)			
UP	.10	.46**	(.94)		
DUP	.02	-.01	.45**	(.87)	
UGAP	-.07	-.48**	-.74**	.26	(.94)

*P < .05 **P < .01 The numbers in the bracket are reliability coefficients.

Table 1 (Continued)

User Developer Group G2 (N = 54)

Variables	Cases	Mean	Std. Dev.	Criterion Validity
UI	48	120.57	13.23	N/A
EUCS	47	49.46	7.52	.68**
UP	46	21.97	9.95	.85**
DUP	46	24.81	9.73	.78**
UPGAP	45	2.84	8.68	N/A

	UI	EUCS	UP	DUP	UGAP
UI	(.89)				
EUCS	.40**	(.92)			
UP	.15	.17	(.95)		
DUP	.39**	-.06	.50**	(.94)	
UGAP	.24	-.24	-.55**	.45**	(.96)

*P < .05 **P < .01 The numbers in the bracket are reliability coefficients.

revealed no significant differences when considering sample distributions of attributes such as equipment used, usage experiences, frequency of usage, expertise, education, and nature of job. Only the degree of directness of usage showed some differences in both groups. More non-respondents used their computer applications directly than did respondents.

5.2 Results of Analysis of the Survey Data

The following data analyses are based on a sample of 122 divided into two groups: G1&2 (General User Group) and G3 (CIS Group).

Table 1 presents the means, standard deviation, criterion validity, reliability, and correlation coefficients among the variables. The reliability of the responses to the instruments, assessed by means of Cronbach alpha reliability coefficient, ranged from .91 to .97. Criterion validity (i.e., the correlation between the criterion question and the item scales) ranged from .64 to .96. All were significant at the .01 level.

To check if actual participation, desired participation, and discrepancy of participation (desired less actual participation) represent distinct constructs, we have applied exploratory factors analysis for both groups of data. The factor analysis used principal components as the extraction technique and varimax as the method of rotation. For combinations of these three measures, factor analysis resulted in explained variances which ranged from 61 to 80 percent and item loadings which ranged from .64 to .94, when two specified factors are extracted. We also applied Campbell and Fiske's (1959) method to examine the discriminant validity of each combination of the three measures. Among 128 comparisons of each analysis, the number of violations ranged from zero to twenty-seven. Thus, we are confident that these measures are reliable and measuring distinct constructs.

Table 2. Results of Regression Analysis (H3)

Variables		Beta	R square change
G1&2 (N = 91)			
	EUCS		
	UGAP	-.39**	.15**
	UI	.39	.15**
	UPGAP * UI	2.93*	.05*
G3 (N = 31)			
	EUCS		
	UGAP	-.53*	.28*
	UI	.03	.00
	UPGAP * UI	.15	.00
G1 (N = 37)			
	EUCS		
	UGAP	-.48**	.24**
	UI	.35	.12*
	UPGAP * UI	1.57*	.01
G2 (N = 54)			
	EUCS		
	UGAP	-.26	.07
	UI	.48**	.22**
	UPGAP * UI	4.47**	.13**

*p < .05 **p < .01

Legend:
EUCS: End-User Computing Satisfaction
UPGAP: Desired UP Less Actual UP
UI: User Involvement

Table 3. Doll and Torkzadeh (1989) Discrepancy Model (H4 to H6)

		Condition States		
	Overall	Equil. or Mod. Depr.	High Depr.	Sat
G1&2	r = .33**	.24	.28	-.03
(N = 91)	n = 75	45	10	18
	p = .00	.06	.22	.45
G3	r = .10	-.04	–	–
(N = 31)	n = 23	19	2	0
	p = .33	.44	–	–
G1	r = .46**	.39*	.57	-.77
(N = 37)	n = 33	22	5	5
	p = .00	.04	.16	.07
G2	4 = .17	.05	-.03	.13
(N = 54)	n = .42	23	5	13
	p = .15	.42	.48	.33

*p < .05 **p < .01

The Simple Computing Impact Model (H1) is supported only in G1&2 ($r = .33$, $p < .01$). Such mixed results are similar to prior results (Ives and Olson 1984). The Cognition Fit Model of (H2) receives strong support for both G1&2 ($r = -.37$, $p < .01$) and G3 ($r = -.54$, $p < .01$).

The procedures used to test the moderator relationships of H3 is based on the suggestion provided by Sharma, Durand, and Gur-Arie (1981). We first test if the interaction term significantly increases the variance explained by the predictors. In this regard, there exist interaction effects for group G1&2 (Table 2). Thus, H3 is supported for G1&2. That is, user involvement moderates the relationship between the fulfillment of the user's expectation and satisfaction. As for the cases without interaction effects, G3 in H3, the User Involvement variable (UI) functions as a exogenous variable, not a moderator.

To test the Doll and Torkzadeh (1989) Discrepancy Model (i.e., H4 to H6), difference scores, reflecting desired less actual participation, were used, with partition criteria as employed by Doll and Torkzadeh (1989). Results are shown in Table 3. Only H4 received moderate support ($r = .24$, $p < .057$) for G1&2.

Finally, we use the regression model suggested by Baron and Kenny (1986) to test the mediating effect in H7. A variable functions as a mediator when (1) the variation of the independent variable is significantly associated with variation in the hypothesized mediator, (2) the variation of mediator variable is significantly associated with the dependent variable, and (3) the effects of the previous two conditions are controlled, a previously significant relation between independent and dependent variables is no longer significant. Table 4 displays these results. Each regression equation represented one of the conditions. If condition one and condition two both exist, then a mediator effect exists only if, in equation three, regression coefficient of EUCS on UPGAP is significant AND regression coefficient of EUCS on UP is smaller than that the equation two. We found that only G1&2 gives moderate support for H7.

5.3 Further Data Exploration

One characteristic of an EUC context is its variety of participation situations (Doll and Torkzadeh 1989). For example, user participation can occur in at least three situations: participation in (1) an application being developed by IS professionals, (2) an application being developed by IS professionals or other end-users and by using friendly end-user tools, (3) an application developed by the user himself. These situations differ in direct user interaction, development tools, and a system development life cycle and have implications for user participation. In addition, the second or third situation may involve a user in a developer role. Different individual or organizational outcomes may result from these different social structures (Galletta and Heckman 1990).

Table 4. Test of a Mediator Effect (H7)

Variables	Beta	R square change
G1&2 (N = 91)		
1. UPGAP		
UP	-.64**	.40**
2. EUCS		
UP	.33**	.11**
3. EUCS		
UP	.31**	.10**
UPGAP	-.29*	.05*
G3 (N = 31)		
1. UPGAP		
UP	-.38	.14
2. EUCS		
UP	.10	.01
3. EUCS		
UP	.10	.01
UPGAP	-.63*	.31*
G1 (N - 37)		
1. UPGAP		
UP	-.74**	.55**
2. EUCS		
UP	.46**	.21**
3. EUCS		
UP	.44*	.19*
UPGAP	-.36	.06
G2 (N = 54)		
1. UPGAP		
UP	-.55**	.31**
2. EUCS		
UP	.17	.03
3. EUCS		
UP	.17	.03
UPGAP	-.21	.03

*p < .05 **p < .01

Legend:

EUCS: End-User Computing Satisfaction

UP: Actual User Participation

UPGAP: Desired User Participation Less UP

Within the General User Group G1&2, we found two distinguishable subgroups, which may deserve further explorations. We separate these PC users into two subgroups – tool users, individuals using standard packages on PCs, and application users, those using *custom-made* applications run on PCs on the basis of the (1) computer application name which each user specified and (2) the degree of direct use of this application. Of the 91 respondents, thirty-seven, who were either custom-made PC application users or custom-made application users in G1&2 using non-PC computers, were categorized as Application User Group (G1). Of the remaining respondents in G1&2 (54 in total), all were PC tool users and were categorized as User Developer Group (G2). For example, if users specified a standard PC package such as dBASE as the application used but used it indirectly, we would categorize them as being in the Application User Group G1. However, if it was used directly, then we would categorize these users as being in the User Developer Group G2.

An analysis of G1 and G2 found that there were no significant differences in demographic characteristics such as experience of usage, expertise of using the application, frequency of usage, education, job nature, and levels of satisfaction, actual and desired participation, and discrepancy of participation. However, there do exist some significant differences between G1 and G2. G1 used a wider variety of computer equipment while G2 used mostly PCs. The User Developer Group G2 used the computer applications mostly individually instead of through intermediaries or computing reports generated by others. The Application User Group G1 is more managerial than operational or professional. Application Users were more involved (considered computer applications as more important or relevant) than User Developers. An analysis of reliability, criterion validity, discriminant validity, and exploratory factor analysis for G1 and G2 revealed similar conclusions as previously stated. We applied the same data analysis methods, as used in analyzing G1&2 versus G3, to G1 versus G2 to test all the hypotheses, H1 through H7. Table 5 summarizes these results.

5.4 Discussion

The results of Hypothesis 1 showed a consistent positive relationship between user participation and user satisfaction across groups; however, only G1&2 and G1 received significant support. One possible explanation for such a difference is that users in G2 and G3 may be involved in an additional developer role. Galletta and Heckman (1990) indicated that one characteristic of end-user computing is that players in this context all were involved in many different roles and subroles. In such situations, role ambiguity and conflict may become common and result in less satisfaction. Another explanation is that users in G2 and G3 used computer applications as working tools and their participation involved more discretional decisions. Over time such users can improve or learn to use the applications better. Participation may then not be a decisive factor in contributing to user satisfaction.

Although the measure of participation (i.e., actual participation) is not a very consistent predictor of participation effects on satisfaction, it does work well when individual differences are taken into account. This is probably because participation activities in the EUC environment are more personal- than organizational-oriented.

For H4 to H6, results are not as predicted in Discrepancy Theory (Doll and Torkzadeh (1989), either in sign or strength. There are a number of possible explanations. Doll and Torkzadeh extended the Alutto and Belasco theory and changed the operationalization. The arbitrariness of categorizing participation criteria may cause some problems. Of course, the small sample size in some cells of Table 3 may also be of concern; however, the results are not as expected even in the cells with about twenty respondents. In addition, their data collection method may

Table 5. Testing Results of Competing Models

Model Name	General User G1&G2 (N = 91)	CIS Staff G3 (N = 31)	Application User G1 (N = 37)	User Developer G2 (N = 54)
H1: Simple Individual Computing Impact Model	Supported ($p < .01$)	NS	Supported ($p < .01$)	NS
H2: Cognition Fit Model	Supported ($p < .01$)	Supported ($p < .01$)	Supported ($p < .01$)	Moderately Supported ($P < .059$)
H3: Moderated Cognition Fit Model	Supported	NS	NS	NS
H4–H6: Discrepancy Model	H4 moderately supported ($p < .057$)	H4 not supported	H4 supported ($p < .05$)	H4 not supported
H7: Mediator Model	Supported	NS	NS	NS

NS: Not Supported

have failed to identify some major end-users, particularly PC users, as indicated by them. Comparing the demographic characteristics of their sample with our random sample, their sample is more oriented toward traditional data processing applications (74.5% of their respondents were non-PC users).

6. CONCLUSIONS

While most user participation studies in IS research have used non-validated instruments and suffer from a lack of theory and inconclusive or mixed results (Ives and Olson 1984), this study applies reliable and validated standard instruments and presents competing theories for evaluation. The study demonstrated that a contingency theory of user satisfaction may be more plausible than the traditional Simple Individual Computing Impact Model and that user participation may be influenced by *both* individual difference and contextual factors. We tested seven hypotheses based on different theories. Most hypotheses received only partial support. However, the Cognition Fit Model (H2) received consistent and strong support across all groups. It seems that the Simple Individual Computing Impact Model is valid only in a context in which a user is not involved in a developer role. Moreover, this study showed that disposition factors such as user's expectation and involvement played a significant part in the relationship between user participation and user satisfaction. However, they functioned quite differently. Users' prior expectations were the basis of their value judgement. The results of this value assessment may influence cognition and motivation about system implementation. Therefore, as predicted by the Cognition Fit Model, users' perceptions of the fit between needs and reality strongly influenced the degree of user satisfaction. Further, this relationship may be moderated by user involvement.

While each theory showed some merit, we emphasize that our subgroup or contextual analyses were exploratory in nature. It is important to study this further and to recognize the variety of participation situations in an end-user computing context. IS research has largely neglected this in concentrating on user participation in a traditional IS environment.

From the practical point of view, these results imply that ***managing the fit of user's desired participation and the actual amount of participation well contributed more consistently toward user satisfaction than simply controlling the actual amount of participation.*** No matter which participation strategy is used, these practices may be a challenge to managers because this relationship may be moderated by dispositional factors (the degree of involvement) or by contextual factors and because more participation may increase the expectation or need to participate.

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