

Investigating the Effects of Sociotechnical Changes

Kee-Young Kwahk

Abstract—Cognizant of the fact that enterprise systems involve organizational change and their implementation is over shadowed by a high failure rate, it is argued that there is the need to focus attention on employees' perceptions of such organizational change when explaining adoption behavior of enterprise systems. For this purpose, the research incorporates a conceptual construct of *attitude toward change* that captures views about the need for organizational change. Centered on this conceptual construct, the research model includes beliefs regarding the system and behavioral intention as its consequences, and the personal characteristics of organizational commitment and perceived personal competence as its antecedents. Structural equation analysis using LISREL provides significant support for the proposed relationships. Theoretical and practical implications are discussed along with limitations.

Keywords—Sociotechnical changes, organizational change, attitude toward change, enterprise information systems.

I. INTRODUCTION

RAPIDLY changing business environments have forced organizations to successfully introduce and manage organizational change to achieve and sustain competitive advantage. To respond to uncertainties in the market environment whilst remaining competitive, organizations continually assess their performance and modify their objectives, policies, and procedures. Organizational change is defined as an attempt, or series of attempts, to modify an organization's structure, goals, technology or work tasks [5]. With organizational change, it is commonly assumed that information systems (IS) have the potential to transform organizations [36]. It has been argued that the adoption and use of IS should be conceptualized as a form of *organizational change* [33]. As a consequence, organizations have considered IS as an enabler of organizational change; and have adopted them to improve organizational productivity. Accordingly, worldwide IS investment has increased significantly year-on-year.

With the ubiquitous growth of IS investment, enterprise resource planning (ERP) systems have become popular means for both medium and large-sized organizations to overcome the hindrances of legacy systems [35]. A study confirmed this popularity of ERP systems, reporting that nearly thirty-four percent of surveyed organizations had investigated, piloted, or implemented ERP packages [6]. Although the popularity of ERP systems seems to continue to rise, unfortunately, their implementation has been plagued by high failure rates and difficulty to realize the promised benefits. Approximately

one-half of all ERP projects fail to achieve anticipated benefits due to managers underestimating the efforts involved in managing change [3]. Compared with traditional and comparative simplistic IT changes, the adoption of ERP systems usually involves radical organizational change as it is often associated with fundamental organizational improvement that cut across functional and organizational boundaries, such as business process reengineering. Consequently, enterprise-wide initiatives have often faced resistance to change from organizational personnel because they are inherently organization-wide systems and their implementation involves multiple stakeholders [2]. The resistance to change is likely to affect employees' beliefs about the system; which may result to their dysfunctional behavior when engaging with the system. This may be one explanation of why ERP systems fail even though their functionality is adequate. One of the keys to understanding the adoption behavior of ERP systems may lie in understanding the attitudes that organizational members have toward change.

II. CONCEPTUAL BACKGROUND AND HYPOTHESES

To explore the role played by attitude toward change, this study situates a construct of attitude toward change within a research model consisting of its consequences (*i.e.*, perceived usefulness and perceived ease of use) and its antecedents (*i.e.*, organizational commitment and perceived personal competence). This section elaborates upon the theoretical background of the study and derives hypotheses.

A. Beliefs and IS Utilization

Extant IS research has explored *how* and *why* organizations and individuals adopt and utilize new IS or IT. One distinct stream of research, the technology acceptance model (TAM) [9], focuses on an individual's acceptance of technology; based on beliefs and intention or usage. TAM has gained popularity in recent years as a tool for assessing and predicting the utilization behavior of IS [26]. TAM posits that actual system usage is influenced by behavioral intention to use the system, which is in turn affected by attitude toward using the system. Finally, attitude is directly determined by beliefs of the system. The model suggests that perceived usefulness and perceived ease of use represent the beliefs that lead to such an acceptance process. Numerous empirical studies have suggested a significantly strong causal relationship between intention and behavior, hence, the use of behavioral intention has been justified as a dependent variable to surrogate actual behavior [28]. Furthermore, IT utilization is a reflection of the acceptance of the IT by users [38]. Whilst choice of behavioral intention as

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the metric for IS utilization behavior appears to be prevalent and pragmatically adequate, IS utilization has been measured in various ways: including computerized logs of actual use, estimates of actual use, estimates of frequency of use, and dependence on the system [34].

Part of this research examines the relationship between perceived ease of use, perceived usefulness, and utilization of the system. Extensive research provides evidence of the significant effect of perceived ease of use on system utilization, either directly or indirectly through its influence on perceived usefulness. IS need to be easy to use and easy to learn in order to prevent the belief that it is 'useful but underutilized'. Many previous studies have indicated that individuals' utilization of the system is influenced by their perceived usefulness. The primary reason that an employee exploits IS that has been launched in an organization is that they find the systems useful for their tasks. The more useful and the easier to use an information system in enabling employees to accomplish their tasks, the more it will be used. It can be also expected that this is true for ERP systems.

H1: Perceived usefulness of an ERP system will have a positive effect on utilization of the ERP system.

H2: Perceived ease of use of an ERP system will have a positive effect on utilization of the ERP system.

H3: Perceived ease of use of an ERP system will have a positive effect on perceived usefulness of the ERP system.

B. Attitude Toward Change

Transforming organizations with information technologies is an important business objective; as traditional structures are often ineffective in producing desired levels of productivity, customer service, employee welfare, and shareholder value [36]. While the adoption of new IS often causes organizations to be dramatically transformed, it does not always lead to successful organizational change. IS are considered to play an important role in organizational transformation process, but only when they are accepted and used by organizational members. In a situation of organizational change efforts, however, newly introduced enterprise systems may not be accepted and used because of significant resistance by the employees; even if their functional and technological characteristics show a desirable level. For organizations to improve their *bottom line* they must have an adaptable work-force that is positively disposed to change [19]. Attitude toward change generally consists of a person's affective reactions to change, cognitions about change, and behavioral tendency toward change [10]. Consistent with this, according to Elizur and Guttman [11], individuals' responses to organizational change are classified into three types. First, affective responses are a greater or lesser feeling of being linked to, satisfied with, or anxious about change. Next, cognitive responses are the opinions one has about the advantages and disadvantages, usefulness, and necessity, and about the knowledge required to handle the change. Then, behavioral responses are the actions already taken or which will

be taken in the future for or against the change.

Organizational members who have favorable perceptions on organizational transformation are likely to proactively participate in any organizational change situation; and possibly look forward to changes in work patterns. They tend to believe that organizational change should be realized to improve organizational performance and their productivity. Therefore, we can expect that individuals with favorable attitudes toward change believe that using the IS required for organizational change will help them to attain gains in job performance. When there is confidence placed in organizational change, perceptions of the usefulness of the system can be greater influenced by beliefs that support the notion that the system will give benefits to the organization and individuals. Furthermore, individuals with favorable attitudes toward change are likely to easily adapt themselves to the new circumstances. They tend to believe that they can learn and utilize new practices and technologies that are needed for the new situation; and without severe cognitive effort on their part. Therefore, we can expect that individuals with favorable attitudes toward change believe that they can learn how to use the information systems required for organizational change with little effort. When individuals are eager to assimilate into organizational change programs, they might perceive that the degree of ease associated with the use of the system is substantially high. This is especially true for the case of ERP systems since they require learning to overcome knowledge barriers, and unlearning of what is already known [35]. When organizational members hold positive views about the need for organizational change, and they believe that such changes are likely to have positive implications for themselves and the organization, they are not likely to resist organizational change initiatives and the deployment of enterprise systems. As a consequence, one could expect that they would be willing to adopt and utilize ERP systems required for organizational change. The more positive the perception on organizational change is, the more useful ERP systems can be, the easier they can be to use and the more they will be utilized.

H4: Favorable attitude toward change will have a positive effect on perceived usefulness of an ERP system.

H5: Favorable attitude toward change will have a positive effect on perceived ease of use of an ERP system.

H6: Favorable attitude toward change will have a positive effect on utilization of an ERP system.

C. Organizational Commitment and Perceived Personal Competence

Recent studies have identified that organizational commitment and perceived personal competence play key roles in employees' acceptance of change [24],[25],[30]. Organizational commitment can be defined as the relative strength of an individual's identification with, and involvement in, a particular organization [31]. Based on the existing conceptualizations of organizational commitment, Meyer and Allen [30] argued that organizational commitment has three components reflecting a desire (affective commitment), a need (continuance commitment) and an obligation (normative

commitment) to maintain employment in an organization. Affective commitment refers to the employee's emotional attachment to, identification with, and involvement in the organization. Continuance commitment refers to an awareness of the costs associated with leaving the organization. Finally, normative commitment reflects a feeling of obligation to continue employment.

Various empirical studies have supported the impact of organizational commitment on attitude toward change. It is argued that individuals with strong organizational commitment would be more willing to accept organizational change if such a change does not alter the basic values and goals of the organization and is seen as beneficial to the organization [39]. In Iverson's [24] research, organizational commitment was found to be the next most important determinant of attitude toward organizational change. An individual's commitment to an organization affects how she or he evaluates organizational change [25]. This implies that a highly committed individual might more readily identify with, and accept, organizational change efforts that are perceived as beneficial. Consistent with this, Guest [19] argued that committed employees are more accepting to organizational change than non-committed colleagues.

H7: Organizational commitment will have a positive effect on attitude toward change.

There has been a considerable amount of research investigating the links between variables of work experiences and organizational commitment [30]. Organizational commitment develops as the result of the satisfying work experiences that are compatible with employees' values; and thus contribute to perceived personal competence [30]. Perceived personal competence can be defined as the degree of the individual's feelings of competence in the work role. Herzberg [21] identified that employees tend to describe the satisfying work experiences in terms of factors that are intrinsic to the job role, which he called motivators. As a consequence, based on this notion, it might be expected that perceived personal competence plays an important role in building the satisfying work experiences that are tightly associated with organizational commitment. Iverson [24] found that job motivation, conceptually similar to perceived personal competence, is the most important determinant of organizational commitment among the other job-related variables including job security and job satisfaction. In other research, perceived personal competence has also been found to be strongly related to organizational commitment [29].

There is a growing body of literature supporting the positive relationship of perceived personal competence to employees' attitude toward change [7]. The change-oriented action is a function of employee motivation; and thus employees with strong perceived personal competence are likely to pursue further change initiatives [14]. In addition, it is argued that employee participation in decision-making, that is considered to be part of perceived personal competence, decreases the resistance to change. High levels of perceived personal

competence derived from the satisfying work experiences give employees self-confidence [14]. Individuals with a strong sense of self-confidence tend to believe that they can execute the particular job under any settings and also perform tasks that are slightly different. Therefore, the more satisfied in perceived personal competence in aspect of their work employees are, the more ready for change they can be; by recognizing ways and means of performing their tasks.

H8: Perceived personal competence will have a positive effect on organizational commitment.

H9: Perceived personal competence will have a positive effect on attitude toward change.

III. RESEARCH METHODOLOGY

A. Sample

The overall approach employed was a field study using a survey methodology for data collection. The data were collected from employee subjects that worked with ERP systems to perform their tasks. A total of 700 questionnaires were distributed and 467 were returned. The returned questionnaires were initially screened for usability and reliability. Finally, 446 responses were found to be complete and usable, rendering a net response rate of approximately 64 percent. The respondent characteristics were analyzed in terms of gender, age, educational background, and tenure. Gender distribution indicated an approximate 1.8:1 ratio in favor of male employees. On average, respondents were approximately thirty-one years old. About 13.3 percent had a high school education, with the remainder of respondents (86.7 percent) having at least a Bachelor's degree. Respondents had on average about six years of work experience.

B. Operationalization

To ensure the content validity of the scales, items used to operationalize the constructs included in this study were mostly adapted and modified from previous studies, with some changes necessary for the target information system and the organizational context.

Perceived usefulness and perceived ease of use were each measured by six items, which were adopted from the previously validated measurement inventory and then modified to suit the context of the present research [9], [15]. The items to measure IS utilization behavior were based on the recommendations of Fishbein and Ajzen [12], Goodhue and Thompson's [17] work, and Rai et al.'s [34] study. Whilst there have been controversial arguments for the measurement of information system usage [18], [37], behavioral intention has been widely accepted as a variable measuring actual usage because it has been theoretically justifiable and empirically supported [23]. However, this study used an additional instrument of user dependence on the target system, as suggested by Goodhue and Thompson [17]; along with behavioral intention items to assess actual behavior of IS utilization. According to Goodhue and Thompson [17] and Rai et al. [34], the information system utilization in an organizational context is well reflected by the

extent to which the information system has been integrated into each individual's work routines. Therefore, IS utilization behavior was assessed by three items reflecting behavioral intention and user dependence on the system. Attitude toward change was measured by thirteen items from the instrument developed by Dunham et al. [10], and modified to suit the current context. These items were designed to reflect three types of response to the introduction of organizational change – affective, cognitive, and behavioral tendency toward change. Scales to measure organizational commitment were adapted from those developed and rigorously validated by Allen and Meyer [1]. Three components of organizational commitment – affective, continuance, and normative commitment – were operationalized by five items respectively. Perceived personal competence was measured by five items from Allen and Meyer's [1] measurement. All question items were measured using a seven-point Likert-type scale, with anchors ranging from 'strongly disagree' to 'strongly agree'.

IV. DATA ANALYSIS

The data were analyzed using LISREL based on the structural equation modeling approach. Data analysis was carried out in accordance with a two-stage methodology to avoid the possible interaction between measurement and structural equation models.

A. Measurement Model

A confirmatory factor analysis (CFA) using LISREL 8.7 was conducted to test the measurement model. The overall goodness-of-fit of the measurement model was examined using the following eight common model fit measures: χ^2/df ratio, GFI, AGFI, NFI, NNFI, CFI, RMSR, and RMSEA. The measurement model in the CFA was revised by removing items, one at a time that had large standardized residuals and/or weak correlations with other items. After removing items, as summarized in Table I, the measurement model exhibited an overall good model fit, with the data collected from the respondents by meeting the acceptance levels commonly suggested by previous research. The exception was for the GFI level. GFI at 0.861 was slightly below but closer to the recommended level 0.90. Although the GFI level could be improved by dropping additional items, it was decided to stop the dropping procedure by considering the content of the measurement. Recognizing the good model fit for the measurement model, further analysis was conducted to assess the psychometric properties of the scales; that is, for the construct validity of the research instruments. The construct validity has two important dimensions: convergent validity and discriminant validity.

TABLE I
FIT INDICES

Fit index	Recommended value	Measurement model	Structural model
χ^2	N/A	1401.89	388.17
df	N/A	657	221
χ^2/df	≤ 3.00	2.133	1.756
GFI	≥ 0.90	0.861	0.929
AGFI	≥ 0.80	0.835	0.912
NFI	≥ 0.90	0.971	0.980
NNFI	≥ 0.90	0.983	0.990
CFI	≥ 0.90	0.985	0.991
RMSR	≤ 0.10	0.043	0.046
RMSEA	≤ 0.08	0.051	0.041

The convergent validity was assessed by three measures, as shown in Table II: factor loading, composite construct reliability, and average variance extracted [13]. In determining the appropriate minimum factor loadings required for the inclusion of an item within a construct, factor loadings greater than 0.50 were considered to be highly significant [20]. A stricter recommendation of factor loading greater than 0.70 was also proposed [13]. All of the factor loadings of the items in the measurement model were greater than 0.60, with most of them above 0.80. Each item loaded significantly ($p < 0.01$ in all cases) on its underlying construct. The composite construct reliabilities were also within the commonly accepted range greater than 0.70 [16]. As a stricter criterion, the guideline with a minimum of 0.80 suggested by Nunnally and Bernstein [32] was applied to determine the adequacy of the reliability coefficients obtained for each construct. Finally, AVE measures the amount of variance captured by the construct in relation to the amount of variance due to measurement error [13]. AVE were all above the recommended level of 0.50 [20], which meant that more than fifty percent of the variances observed in the items were explained by their underlying constructs. Therefore, all constructs in the measurement model had adequate convergent validity.

TABLE II
CONVERGENT VALIDITY TEST

Constructs*	Items	Factor loading	Composite reliability	AVE
OCA	oc1	0.798	0.862	0.612
	oc2	0.650		
	oc3	0.786		
	oc4	0.879		
OCC	oc5	0.735	0.848	0.583
	oc6	0.851		
	oc7	0.753		
	oc10	0.707		
OCN	oc12	0.802	0.835	0.560
	oc13	0.775		
	oc14	0.758		
	oc15	0.649		

ACA	ac1	0.727	0.868	0.687
	ac2	0.893		
	ac3	0.858		
ACC	ac4	0.822	0.904	0.701
	ac6	0.864		
	ac8	0.822		
ACB	ac9	0.840	0.907	0.766
	ac10	0.912		
	ac11	0.893		
PEU	ac12	0.818	0.945	0.776
	peu1	0.877		
	peu2	0.869		
PU	peu4	0.853	0.936	0.745
	peu5	0.913		
	peu6	0.892		
U	pu1	0.826	0.898	0.747
	pu3	0.885		
	pu4	0.873		
PPC	pu5	0.889	0.848	0.585
	pu6	0.840		
	u1	0.907		
	u2	0.919	0.876	0.585
	u3	0.757		
	ppc2	0.717		
	ppc3	0.857	0.848	0.585
	ppc4	0.699		
	ppc5	0.776		

^aOCA, OCC, OCA: Affective, Continuance, Normative Organizational Commitment; ACA, ACC, ACB: Affective, Cognitive, Behavioral Attitude toward Change; PEU: Perceived Ease of Use; PU: Perceived Usefulness; U: IS Utilization; PPC: Perceived Personal Competence

The discriminant validity was examined as follows. The shared variances between constructs were compared with the average variance extracted of the individual constructs [13]. To confirm discriminant validity, the average variance shared between the construct and its indicators should be larger than the variance shared between the construct and other constructs. As shown by comparing the inter-construct variances and average variances extracted in Table III, all constructs share more variance with their indicators than with other constructs. As a consequence, these results revealed no violation of the criteria for the discriminant validity of the constructs in the research model.

TABLE III
DISCRIMINANT VALIDITY TEST USING AVE COMPARISON

Constructs	OCA	OCC	OCN	ACA	ACC	ACB	PEU	PU	U	PPC
OCA	0.61									
OCC	0.51	0.58								
OCN	0.44	0.34	0.56							
ACA	0.16	0.07	0.12	0.68						
ACC	0.27	0.15	0.16	0.67	0.70					
ACB	0.22	0.14	0.20	0.50	0.63	0.76				
PEU	0.09	0.08	0.11	0.15	0.14	0.16	0.77			
PU	0.21	0.09	0.10	0.22	0.37	0.28	0.17	0.74		
U	0.21	0.11	0.06	0.23	0.39	0.26	0.23	0.56	0.74	
PPC	0.34	0.23	0.27	0.17	0.28	0.23	0.07	0.18	0.20	0.58

Note: Diagonals represent the average variance extracted between the constructs and their measures. Off diagonal entries are the shared variances among constructs. All diagonal entries are greater than relevant off diagonal entries.

B. Structural Model

The structural model, including the research hypotheses and the causal paths, was examined using the confirmed measurement model. All constructs were modeled as being reflective, and most of constructs in the model were measured directly using multiple indicators. The only exceptions lie in the organizational commitment and attitude toward change dimensions, which are represented by summated scales based on the measurement model. This was considered reasonable since the first order and second order CFA confirmed their construct validity and multidimensionality. The model's overall fit with the data was evaluated by the same set of fit indices used in the measurement model (refer to Table I). The structural model exhibited a fit value satisfying the commonly recommended threshold for the respective indices, providing evidence of a good model. The path coefficients and the overall fit indices are shown in Figure 1, along with the portion of the variances explained.

As is evident from Fig. 1, LISREL results provide strong support for hypotheses 1, 2, and 3, which were essentially drawn from the specification of TAM and have been empirically validated from previous studies [9],[26]. Hypotheses 4 and 5 were significantly supported. Attitude toward change is a strong predictor of both perceived usefulness (hypothesis 4) and perceived ease of use (hypothesis 5). While attitude toward change has an indirect impact on IS utilization through perceived usefulness and perceived ease of use, it also influences directly IS utilization, showing a strong support for hypothesis 6. Both organizational commitment and perceived personal competence had a significant effect on attitude toward change (hypothesis 7 and 9). Furthermore, hypothesis 8 was strongly supported, indicating that perceived personal competence is an antecedent of organizational commitment.

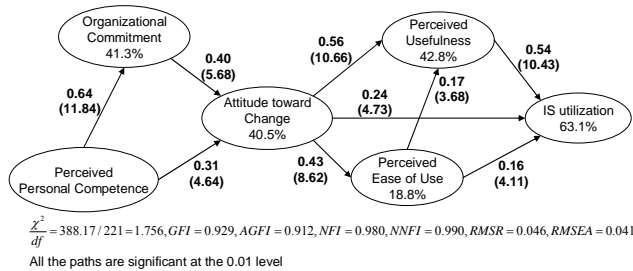


Fig. 1 Model Testing Results

V. DISCUSSION

A. Findings and Limitations

Overall, support was found for the research model in this study. The data showed that IS utilization behavior was significantly affected by beliefs about the system's usefulness and ease of use. At the same time, it was observed that the utilization behavior was highly dependent on attitude toward change. Examining the relative importance of the three determinants of IS utilization identified in this study, it was found that perceived usefulness had the most effect on IS utilization behavior. The path coefficient from the perceived usefulness to IS utilization construct was 0.54, whereas the remaining path coefficients were 0.24 (attitude toward change) and 0.16 (perceived ease of use) respectively. It appears that the perceived usefulness construct remains the most significant predictor of IS utilization behavior, which is consistent with most of the prior studies. In addition, it was also found that perceived ease of use significantly affects perceived usefulness, as suggested by many prior studies.

As anticipated, attitude toward change significantly affected perception of an ERP system's usefulness and ease of use. Favorable attitude toward change leads users to understand the benefits of ERP system that will make them productive because they believe that the launch of ERP system is part of organizational change efforts; and organizational change will enhance organizational performance and their productivity. Additionally, favorable attitude toward change leads users to perceive the ERP system to be easy to use because they believe that they can easily learn how to use the new system. This implies that an individual's attitude toward change plays a role as both direct and indirect determinant, through beliefs about the system's technological attributes, of system acceptance. As a consequence, further analysis was conducted on the total effects of the related constructs on the IS utilization behavior. Considering the total effects, including both the direct and the indirect effects, it was found that attitude toward change had the most impact on IS utilization behavior: specifically, attitude toward change, 0.65; perceived usefulness, 0.54; and perceived ease of use, 0.25. In an ERP system environment, users are more concerned with changes derived from how the ERP system affects the organization, rather than the discrete technological attributes.

This research identified that individual's favorable attitude toward change plays an important role in the formation of positive ERP system utilization, regardless of ways of how it

affects. Therefore, it is necessary to examine how it can be formed in order to take appropriate steps to lead to more acceptance of the system by organizational members. One mechanism for influencing attitude toward change is through organizational commitment. Because organizational commitment basically reflects a belief in the values and goals of an organization, individuals with strong organizational commitment are willing to accept organizational change efforts that are considered to be beneficial to the organization. Another mechanism for influencing attitude toward change is through perceived personal competence in the work role. Perceived personal competence is similar to job motivation in that it is associated with the satisfying work experiences, and self-efficacy in that it provides self-confidence in the work role. Individuals with strong satisfying work experiences and high self-confidence are ready to accept organizational change efforts because they believe that organizational change will bring about a better work environment and they can accomplish difficult tasks under any settings. Furthermore, it was found significant support for the concept that perceived personal competence affects organizational commitment. This result indicates that when the perceived personal competence is well controlled, attitude toward change will be improved either directly or indirectly through organizational commitment.

B. Implications: Theoretical and Practical

This study proposes several implications for theory development as well as practice. For researchers interested in extending this line of work, the first issue is concerned with antecedent factors of IS adoption behavior. Orlikowski [33] demonstrated that adopting and using a specific IT is not solely dependent on the characteristics of the IT but is also dependent on other aspects such as organizational or social context. Attitude toward change is a social antecedent, while perceived usefulness and perceived ease of use are technological ones. These two distinct sets of antecedent constructs are intertwined in this research. Recognizing the nature of IS adoption behavior involving social and technological aspect, this study can be discussed in the framework of socio-technical systems (STS) theory and its related research. The STS theory assumes that an organization or organizational work system can be described as a socio-technical system. In other words, a work system is made up of two jointly independent, but correlative interacting systems – the social and the technical [4]. It is assumed that the outputs of the work system are the result of joint interactions between these two systems. Thus, any intervention or planned change effort such as IS introduction must deal with both systems in an integrated form [4],[36]. This means that the adoption of IS should be explained and predicted in the simultaneous perspective of the social system and the technical system.

It is argued that ERP systems adoption is a complex exercise in technology innovation and organizational change management [27]. Because organizational changes induced by ERP implementation often lead to different power and resource allocations, ERP introduction usually triggers a diverse group of overt and covert opponents within the organization [22]. Any

ERP project will face a certain level of organizational resistance to change, which is directly associated with attitude toward change of individuals. Therefore, the findings of this study emphasize the importance of management about the employees' attitude toward change induced by ERP implementation, particularly considering that some executives see ERP systems as a means for exerting more management control and forcing more-uniform processes [8].

There are additional issues for researchers interested in further investigating attitude toward change construct. In this study, the degree of attitude toward change was measured retrospectively. An alternative way of measuring this construct would be before and after an ERP system is adopted and used. This suggests the need for a longitudinal study to compare results with the cross-sectional approach applied in this study. In addition, given that attitude toward change consists of three dimensions (*i.e.*, affective, cognitive, and behavioral intent), the role of individual dimensions in the nomological net is worthy to be examined. This allows researchers to isolate the effects of each dimension on beliefs about the system and IS utilization. Finally, in order to establish the relevance of attitude toward change as a predictor of beliefs about the system, other key determinants of these beliefs might be considered in a future research.

From the perspective of practice, there are some additional implications. There has been growing interest in ERP systems, which may be explained by their proclaimed benefits [33]. Despite the promised benefits, ERP systems are considered to be inherently risky because they require significant organizational resources and organizations often adjust slowly to complex ERP system packages [2], [33]. Thus, ERP systems are viewed as a completely different class of IT application compared with traditional IT systems. Organizations installing the same ERP system might experience differing degree of response to the change depending on the organizational members' attitude and the organizational environment in which it is implemented. That might explain aspects of why many organizations installing and launching the same ERP system show the mixed results with their acceptance. This study sheds some light on this issue by showing that attitude toward change influences IS utilization behavior. The technological perception on the system and the individual's attitude toward change are shown to be two distinct sets of beliefs, each contributing in its own right to utilization behavior, implying that organizations trying to introduce new ERP systems need to pay attention to both aspects. Therefore, this finding emphasizes the need for practicing managers in charge of the introduction of ERP systems to focus on readiness for change of the organizational members as well.

VI. CONCLUSION

Within an organizational context, there have been a number of issues influencing individual's choice to use IS. This research investigated two aspects of this choice in the ERP systems context: attitude toward change and beliefs about the technological attributes of the system. The introduction of enterprise-wide systems calls for critical decisions that consider

the large investments and the implications leading from the initiatives. Recognizing that ERP systems are different from traditional IT systems and their implementation is over shadowed by a high failure rate, this study focuses attention on individual's perceptions of such organizational change. Consequently, the framework developed in this work incorporated a conceptual construct called *attitude toward change* that captured beliefs about positive implications of organizational change. Centered on the construct of attitude toward change, the proposed research model included beliefs about the system and utilization behavior as its consequences, and the personal characteristics of organizational commitment and perceived personal competence as its antecedents. The study results provide significant support for the proposed relationships. Acknowledging that ERP systems continue to grow with promising potential benefits, this study has value for theoretical as well as practical development; while several avenues for future research remain.

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