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ABSTRACT

Lack of user influence or user responsibility is often a key risk factor in IS development projects. Although these two factors are pertinent to the performance of project management, the IS literature on user participation or user involvement often overlooks the factors of "user influence" and "user responsibility." We conducted a survey with 151 IT project managers in order to understand the degree of impact of these two individual factors on IT project management performance. We propose that organizational technology learning mediates the relationship; therefore this study also investigates this factor. Regression analysis was conducted to assess the degree of interdependence among (1) user influence, (2) user responsibility, (3) organizational technology learning, and (4) IT project management performance. The analysis shows that user influence has a direct impact on organizational technology learning, and an indirect effect on IT project management performance through the mediating factor. However, user responsibility has no direct or indirect effect on these factors. Practical implications are suggested for IT project managers to more effectively manage projects by increasing user influence.

Keywords

User influence, user responsibility, organizational technology learning, IT project management performance.

INTRODUCTION

User participation in information systems development (ISD) is more likely to deliver the resultant system on time and within budget. Users can also have a higher overall satisfaction because the deliverables can better reflect their needs. However, many problems can arise to discourage or stop users from actively participating in ISD process. Some salient problems include (1) the inability to distinguish different levels of description to meet the needs of various kinds of stakeholders, (2) ambiguity, confusion, and amalgamation of user requirements, and (3) lack of consistent and standardized methods of documenting user requirements (Sommerville, 2006). In fact, user participation, can pose more threats to the pre-implementation of IS because of the unknown complexity (Wagner and Newell, 2007).

With rapid changes to today's customer-driven environment, user requirements fluctuate constantly and have become increasing hard to predict and control (Gorschek et al., 2007). Uncertainty and disagreement create conflict and can easily confer the ineffectiveness of user participation. In order to mitigate the negative impact and drive users to actively participate in the ISD process, users need instrumental and politically motivated justifications (Howcroft and Wilson, 2003). For instance, users need to have political power to influence the direction of a project if conflict surfaces. Users need to be entrusted with the ability to choose the system features that meet their needs. In addition to user influence, clear roles and responsibilities can empower users to exercise his/her rights to work with others without creating conflict. The ability of users to collaborate with each other can effectively promote the organizational learning process to acquire technology. User participation is not equal to "user influence" or "user responsibility," however empowered users who know their roles and responsibilities and can better control their own progress in relation to others. Empowerment and accountability are part of facilitating conditions to increase the odds of IS success (Sabherwal, Jeyaraj and Chowa, 2006).

The goal of this study is to investigate the impact of user influence and user responsibility on IT project management performance. The exercise of these two political factors can create changes to the ISD process. We adopted a mediating factor to help uncover the ISD dynamics driven by user influence and user responsibility before achieving project success. The mediating factor is referred to as organizational technology learning and focuses on the process of acquiring technology

skills and knowledge via organizational learning. We propose that learning about this mediating factor can provide a clearer picture about the logical relationships among user influence, user responsibility, and IT project management performance.

In the following section we present the theoretical background and hypotheses for this research. The subsequent sections present the research design followed by the study limitations. The final section presents a summary of our research and provides implications for managers and researchers.

THEORETICAL BACKGROUND AND HYPOTHESES

A clear impact of user participation on IS success remains elusive from the findings of previous studies (Harris and Weistroffer, 2009). One of many salient reasons is that lack of "user support" or "user commitment" can confer ineffectiveness of user participation. Involving users in a project without granting them with power and accountability can eventually lead to poor project performance.

Users with power can have influence on the direction of a project. Accountability is the responsibility of users that directly link to the success and failure of a project. Users feel psychologically empowered and are more actively to use the system when given the ability to reconfigure systems (Wang, 2006). Although these two factors are apparently pertinent to the performance of project management, the IS literature on "user participation" often overlooks the "user influence" and "user responsibility." The concept of user participation often only measures "user-IS relationship," "user activities," and "user involvement." User influence and user responsibility are not included. However, we know from previous research that user participation is a critical IS project management topic. In this study we propose that the IT project manager must also be aware of "user responsibility" and "user influence," given that these factors have positive impacts on the process and final outcomes. As mentioned above, we adopted the mediating factor of organizational technology learning to help uncover the ISD dynamics driven by user influence and user responsibility before achieving project success. In the following sections we define these factors and they role they play in impacted IT project management performance. Based on this background, we present our hypotheses for study.

User Influence and Organizational Technology Learning

User influence is "the extent to which members of an organization affect decisions related to the final design of an information system" (McKeen et al., 1994, p. 434). Users can engage in the group learning process by exhibiting influence from different standpoints (for or against certain project requirements). Users play an important role in influencing an IT project to their advantages via the group learning process. The ability of users to influence the group learning process can thus accelerate, decelerate or terminate the implementation process of an IT project (Bondarouk, 2006). A user can leverage many factors to facilitate the organizational technology learning process. Those factors may include organizational culture factors of localness, transformational leadership and openness (Hult et al., 2000). Simply extending invitations to users and having their participation is not sufficient to an effective organizational learning process. In order to promote the organizational learning, user influence is an action-oriented factor that must take place.

Organizational learning is an important factor, which constantly occurs through different phases of the software development life cycle. For example, requirement analysis is a typical organizational learning activity that takes place in the initial planning and analysis phases. In this research, we define organizational technology learning as technology knowledge learned acquired by the firm (Cooprider and Henderson, 1990-1991).

Research has found that a higher degree of involvement by all project stakeholders, specifically user influence, can improve the success in ISD outcomes (Zmud, 1980; Kendall and Kendall, 2005). Most ISD projects involve interdependent parties including users, IS staff, managers, and vendors. Each party has its own interests to represent and goals to achieve. When goals are divergent or in conflict, interference and disagreement will surface (Barki and Hartwick, 2001); furthermore, users of all kinds have cognitive limitations that can result in the ineffectiveness of requirements elicitation (Pitts and Browne, 2007). When discrepancy in requirements analysis among stakeholders becomes an issue and cannot be effectively resolved, the organizational learning process is disrupted. Based on this background, we present the following hypothesis:

> *Hypothesis 1: User influence leads to organizational technology learning.*

User Responsibility and Organizational Technology Learning

User responsibility refers to the activities and assignments reflecting a user's overall leadership or accountability for the ISD project (Hartwick and Barki, 1994). A user has responsibility if he/she is in charge of or accounting for elements of project

success. User responsibility is part of user participation that refers to the assignments, activities, and behaviors that users of their representatives perform during the system development process (Barki and Hartwick, 1994).

The extent of user responsibility is a good indicator for the degree of organizational technology learning. For instance, a user is more likely to review the works-in-progress and have their comments incorporated into the design of a system if the user feels responsible for the quality of the adopted system. Users are more likely to engage in hands-on activities during the physical design or implementation. Vested with responsibility, users will continue to evolve to more complex relations with the adopted system. User reviews during the ISD process can help reduce requirements uncertainty and improve the responsiveness of the system (Majchrzak, et al., 2005). Increasing user responsibility can help an organization successfully sustain cross-functional integration (Emery, 2009).

A clear roles and responsibility for participants in small and large projects alike can help them understand what they are expected to do, and what roles they need to play individually and with others in order to achieve project goals. User responsibility, for instance, is an important issue when considering exceptions in making new rules to the design of a decision support system at the domain knowledge and the system levels (Chen, 1992). Successful implementation of information centers (IC) requires clear user responsibilities (Christy and White Jr., 1987).

Ambiguous user roles and responsibilities can increase the degree of uncertainty in a project. A clear guidance to help users perform assigned roles and responsibilities can lead to more effective organizational technology learning experience. A responsible user can (1) locate right information for the job to be done, (2) demand right tools for the job, (3) utilize IT to achieve personal and professional goals, and (4) integrate IT into a set of necessary professional skills (Licker, 2006). Based on this background, we present the following hypothesis:

> *Hypothesis 2: User responsibility leads to organizational technology learning.*

Organizational Technology Learning and IT Project Management Performance

The ISD process involves intensive user and system interactions. Organizational technology learning refers to skill learning and knowledge acquisition activities that take place from these interactions (Rus and Lindvall, 2002). Stakeholders, vested with different repositories of knowledge, skills, expertise, perspectives, and interests, join a team. ISD success relies on the ability of a project team to integrate individual domain of knowledge and convert them into learned knowledge (Okhuysen and Eisenhardt, 2002). The learned knowledge is manifested with the design, functionality, policies, and features of the resultant system that meet the collective interests. Organizational technology is about learning in the conversion process (Cooprider and Henderson, 1990). Knowledge acquired by an organization can be related to: (1) the use of key technologies, (2) the use of development techniques, (3) how to support business via the key technologies and (4) overall knowledge acquired through project implementations (Nidumolu, 1995).

Organizational technology learning plays a mediating role in minimizing the impact of the lack of skill risks on project performance (Jiang et al., 2007). User diversity can potentially contribute to system success if managed properly to generate new ideas. The process of new ideas generation is part of organizational technology learning. Improving the effectiveness of technology learning process can turn user diversity into advantages and help increase system success (Wang et al., 2006). Prototyping is an effective and a practical system development method to reduce the lead time in the face of rapid environment changes. Users can also gain first-hand experience with the design of interface and system via prototyping. All these evidences show that organizational technology learning and user-IS interaction effectiveness can increase the chance of system success (Beck, Jiang and Klein, 2006). Based on this background, we present our final hypothesis:

> *Hypothesis 3: Organizational technology learning leads to project performance.*

Our research model was developed based on these three hypotheses. The model is shown in Figure 1.
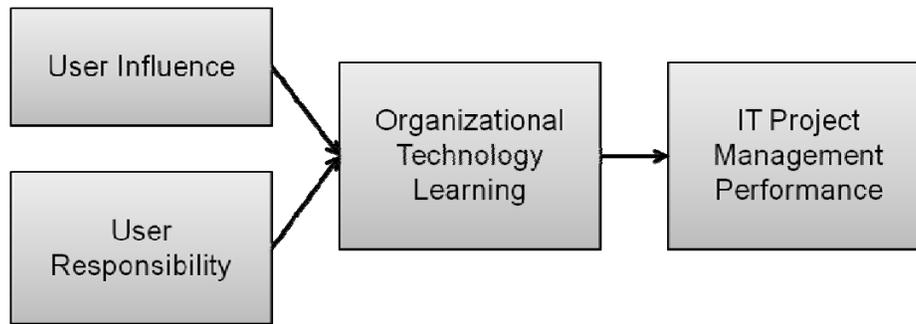
Figure 1. Research Model

RESEARCH DESIGN

Sample

Questionnaires were mailed to 500 randomly selected IT managers in the U.S. from members of the Project Management Institute (PMI) Information Systems Special Interest Group (http://www.pmi-issig.org/). It is expected (as members of the group) the subjects are familiar with the software project activities and outcomes. Postage-paid envelopes for each questionnaire were enclosed. All the respondents were assured that their responses would be kept confidential. Of the initial surveys mailed, a total of 85 valid responses were received. In order to increase the response rate, two follow up mailings were conducted. The total number of responses from the three rounds was 151.

Non-response bias is when the answers to the survey by the respondents do not represent the overall target sample. One test for potential non-response bias is to compare the demographics of early versus late respondents (Sivo, Saunders, Chang and Jiang, 2006). T-tests were computed on the means of key demographics (work experience, project duration, and team size) for the first and third mailings to examine whether significant differences existed. No significant differences were found; therefore, all respondents were combined for further analysis. Demographic features of the sample are shown in Table 1. Since project duration and team size are believed to influence project management performance, these are included as control factors in the analysis.

Factors	Categories	Number	Percent
Gender	Male	97	64 %
	Female	54	36 %
Job position	IS Manager	61	40 %
	Project Leader	79	52 %
	IS Professional	11	8 %
Industry type	Service	117	77%
	Manufacturing	34	23 %
# of IS employee	< 11	9	6 %
	11-100	35	23%
	101-500	38	25 %
	> 500	69	46 %
Avg. Team Size	< 8	40	26 %
	8-15	63	42 %
	16-25	30	20 %
	> = 26	18	12 %
Avg. Project duration	< 1 year	83	55 %
	1 - 2 years	52	34 %
	2 - 3 years	10	7 %
	> 3 years	6	4 %
Note: The total sample size is 151.			

Table 1. Demographic Features

Instrument Measures

User influence refers to the extent to which members of an organization affect decisions related to the final design of an information system (Kanungo and Bagchi, 2000). A total of three items adopted were used to measure the influence that users generate during the development process. Items were scored on a five-point Likert-type scale (1=None at all, 5=A great extent). The specific items to measure this construct (as well as the others) are listed in Table 2.

User responsibility refers to the activities and assignments reflecting a user's overall leadership or accountability for the ISD project (Hartwick and Barki, 1994). Examples of user responsibility would include being a project team leader, having responsibility for system success, hardware or software selection, costs, or funds (Hartwick and Barki, 1994). Similar to the measure of user influence, a total of three items adopted were used to measure user responsibility.

Organizational technology learning describes the technology knowledge learned acquired by the firm (Cooprider and Henderson, 1990-1991). The original instrument was developed by Cooprider and Henderson (1990-1991) and further examined by Nidumolu (1995). Four items were used to measure this construct: (1) knowledge acquired by firm about use of key technologies, (2) knowledge acquired by firm about use of development techniques, (3) knowledge acquired by firm about supporting users' business, and (4) overall knowledge is acquired by your organization through the project conducted. Respondents were asked to indicate the extent the items typically occurred when developing information systems in their organizations. Each item was scored using a five-point scale (1=Never occurring, 5=Always occurring). All items were presented such that the greater the score, the greater the extent of the particular item occurred during the system development.

Project Management Performance in our study is specific to IT managers because our sample included only IT managers. Researchers argue a minimum of three dimensions of project management performance: (1) meeting budget, (2) making schedule, and (3) satisfying user requirements (McFarlan, 1981). Others suggest additional dimensions to include the amount and quality of the work produced and an ability to meet project goals (Deephouse et al., 1995). The items adopted by this study are from Henderson and Lee (1992). Similar items were also used by Jiang, et al. (2006). Our questionnaire asks typical satisfaction of project management performance for an organization during ISD. Items were scored on a five-point scale (1=Never, 5=Always). All items were presented such that the greater the score, the greater the satisfaction of the item.

Data Analysis and Findings

We used Partial Least Squares (PLS) analysis to test the item reliability, convergent validity, and discriminant validity (Chin, 1998). Individual item reliability is examined by observing the factor loading of each item. A high loading implies that the shared variance between constructs and its measurement is higher than error variance (Hulland, 1999). To be viewed as having high reliability, factor loadings should be significant (t-statistics in table 2) and greater than or equal to 0.70. Table 2 shows that the factor loading for each item is above 0.70 except one item in residual performance risk (i.e., 0.66). Because of the successful, historical use of this construct, the item is retained in further analysis. Item-total correlation (ITC) refers to the correlation between an individual item and the total score of all other items in the same construct. ITC can be used to understand the internal consistency of a construct. Items with extremely low ITC (e.g. < 0.3) should be eliminated before conducting advanced analysis.

Measurement Items	Loading	ICC	t-statistics
UI1. How much influence did users have in decisions made about his system during its development	0.83	0.60	22.83
UI2. To what extent were your opinions about this system actually considered by users?	0.78	0.55	12.51
UI3. Overall, how much personal influence did users have on this system?	0.88	0.70	43.71
UR1. Did users have responsibility for requesting additional funds to cover unforeseen time/cost overruns?	0.68	0.36	9.83
UR2. Did users have responsibility for the success of the new system?	0.79	0.45	22.37
UR3. Did users have main responsibility for the development project during system definition and system implementation?	0.77	0.43	19.45
L1. Knowledge is acquired by your organization about use of key technologies	0.84	0.69	33.64
L2. Knowledge is acquired by your organization about use of development techniques	0.82	0.66	21.97
L3. Knowledge is acquired by your organization about supporting users activities	0.79	0.62	21.32
L4. Overall knowledge is acquired by your organization through the project conducted	0.75	0.57	11.64
PP1. Ability to meet project goals	0.80	0.69	25.13
PP2. Expected amount of work completed	0.79	0.67	20.70
PP3. High quality of work completed	0.74	0.62	15.75

PP4. Adherence to schedule	0.82	0.73	21.63
PP5. Adherence to budget	0.78	0.68	17.74
PP6. Efficient task operations	0.78	0.68	23.24

Table 2. Convergent Validity of Theoretical Constructs

Convergent validity should be assured when multiple indicators are used to measure one construct. Convergent validity can be examined by composite reliability and variance extracted by constructs (AVE) (Fornell and Larcker, 1981). To obtain the composite reliability (CR) of constructs (>.070 recommended), the sum of loadings is squared and then divided by the combination of the sum of squared loading and the sum of the error terms (Werts, Linn and Joreskog, 1974). AVE reflects the variance captured by indicators. If the AVE is less than 0.5, it means that the variance captured by the construct is less than the measurement error and the validity of a single indicator and construct is questionable (Fornell and Larcker, 1981). The results shown in Table 2 indicate the constructs adopted in this study exhibit an acceptable level of convergent validity.

Discriminant validity focuses on testing whether the measures of constructs are different from each other (Messick, 1980). It is assessed by testing whether the square root of the AVE is larger than the correlation coefficients (Fornell and Larcker, 1981; Chin, 1998). For each construct in this study, the square root or AVE is larger than the correlation between each pair of constructs (see Table 3). The responses have good distribution since skewness is less than two and kurtosis less than five (Ghiselli, Campbell, and Zedeck, 1981).

Constructs	Cronbach Alpha	CR	AVE
User Influence	0.76	0.87	0.69
User Responsibility	0.60	0.79	0.56
Organizational Technology Learning	0.81	0.88	0.64
Project Management Performance	0.87	0.91	0.61

Table 3. Discriminant Test

Table 4 shows the results of the regression model. Hypothesis H1, testing the relationship between user information and organizational technology learning, *was supported* at the 0.05 level with path coefficients of 0.321. This result shows that *user influence has a significant positive impact on organizational technology learning*. Hypothesis H2, testing the relationship between user responsibility and organizational technology learning, *was unsupported* at the 0.05 level. Hypothesis H3, testing the relationship between organizational technology learning and project performance, *was supported* at the 0.05 level with path coefficients of 0.144. This result shows that *organizational technology learning has a significant positive impact on IT project management performance*.

Constructs	Learning	System Success
User Influence	0.321 **	0.144 *
User Responsibility	0.139	0.007
Organizational Technology Learning		0.069
R^2	0.151	0.515
Note: One-tailed		

Table 4. Data Analysis and Results

LIMITATIONS OF THE STUDY

The first limitation of the study is the use of a single source for the survey instrument by excluding users and targeting project and IT managers. Though the managers will have a good impression of the scope, they will not have the user perspective that might incorporate other characteristics into the measure such as perceived degree of influence and responsibility. This is important as users often feel marginalized by involvement that appears to have little or no impact. Additionally, the measures require perceptive evaluations after completion of a project when memories about the items may have dissipated or become mingled with other projects and processes. The factors themselves may cause some difficulty to the managers when evaluations are required as to the extent of changes in the system encountered and projected. We asked project mangers about user influence and responsibility based on their perception. This is an indirect measure rather than a direct measure of user's self perception about the degree of influence and responsibility. The gap may confer the insignificance of the impact of user responsibility on organizational technology learning. Additionally, many models have been proposed listing factors that might influence software quality and implementation, while this study only controlled for cost and time compliance.

CONCLUSIONS AND IMPLICATIONS

The focus of this study is to examine the direct influence of "user influence" and "user responsibility" on IT project management performance. Organizational technology learning is a mediating factor in the logical relationship. Specifically, we argue that, user influence and user responsibility have a positive impact on IT project management performance and the overall success of an ISD. However, the magnitude of the impact of these two factors on IS success varies with if the organizational technology learning occurs.

Our survey of 151 IT project managers confirms the proposed hypothesis that although user influence has a direct influence on IT project management performance, organizational technology learning is an effective mediator to mitigate the magnitude of impact. When user influence is high, it has a stronger immediate effect on organizational technology learning than on IT project management performance. In contrast, user responsibility does not have any effect on either organizational technology learning or IT project management performance.

These results imply that it is more important to give users power to influence the ISD process. Organizational technology learning will intensify along with the increased user influence. As a result, the chance of IT project management performance and ISD success can be largely increased. However, increasing users' responsibility to promote organizational technology learning is not an effective method. We conclude that an IT project manager is the ultimate person accountable for system success or failure. However, a project manager needs to give users chances to exert influence on the ISD process. The more influence users have the higher degree of organizational technology learning among team members can be promoted. A project manager should continue to engage and empower users in the learning process in order to assure system success is achieved.

Managerial Implications

Our study presents two major implications for IT project managers. First, user involvement includes at least two essential dimensions: user influence and user responsibility. These two indictors are measurable and they attract little attention from the past study. Different methodologies (e.g. user-IS interactions, reward and enforcement) were proposed to promote the organizational technology learning. This study introduced a new method from the perspective of user influence and user responsibility. The user influence should be emphasized, whereas user responsibility should not be. We suggest that project managers, in addition to the existing methods to promote organizational technology learning, should also pay attention to user influence.

Second, of major components of user participation, we focus on user influence. The practices examined included the presence of user influence and user responsibility across ISD life cycle. User influence can be exerted through formal procedures or informal practices. Development methods that empower users are more likely to succeed in promoting user-IS interactions.

Research Implications

Along with managerial implications, our study presents implications for researchers. This study thus adds the new two perspectives of user influence and user responsibility in understanding the effect of user participation. User involvement is the underlying principle in most of the discussions related to IT project management literature. The result of this study provides evidence that management practice to empower users can encourage organizational technology learning, thereby increasing the chance of system success. Past studies have mainly focused on user involvement in general. This study further decomposes this factor into two subcomponents – user influence and user responsibility, and investigates their effects on system success.

Furthermore, learning about the mediating factor of organizational technology learning provides a clearer picture about the logical relationships among user influence, user responsibility, and IT project management performance.

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