Developing a Framework for User Participation in Information System Development Projects

Completed Research

Khet Khet Oo Tha
School of Information Systems and Technology Management
UNSW Business School
University of New South Wales
Khet.ootha@student.unsw.edu.au

Abstract

While project management has become one of the more popular organizational disciplines over the last few decades, ironically, project success statistics suggest that most projects still fail, and thus do not accomplish their business objectives. This therefore presents a unique opportunity to study this phenomenon to improve success rates in this discipline. As projects are complex, multi-dimensional phenomena, it can be examined from various perspectives. In this study, the phenomenon of IT project success is examined from the user perspective by developing a theoretical framework that investigates the role of user participation and involvement in determining ISD project success.

Keywords

Project management, Information System Development (ISD), user participation, project success, participative decision making, theoretical framework

Introduction

Participation from the target users in information system development (ISD) has been the core topic of Information Systems research since 1960s (Swanson 1974). The need to involve end users in the development of an information system is accepted by the IS research community and assumed to apply to all specialty areas within the field of IS (e.g. Project Management, Software Engineering, Human Computer Interaction) (Ives et al. 1983). Focusing on traditional IS development in an organizational work context (DeLone and McLean 1992) argue that an information system is not successful if it is not used by its intended users. For example, when IS applications support core business processes such as internet banking, it may be fatal to an organization if the intended users fail to use the system (Iivari et al. 2010). Today almost every IS project takes place in a context where end-users play a major role in the accomplishment of tasks; thus changes in end-users' needs can often cause project initiation. Therefore, it is important that end-users are involved both in the clarification of needs and the development of specifications at the beginning of the project (Karlsen et al. 2006). Indeed, it is the end-users that ultimately determine whether a project is a success, based on the project results (Zviran et al. 2006). Although there have been numerous studies on understanding the user and capturing the requirements, it is evident that the user largely remains unknown when the studies are examined in detail (Iivari et al. 2010). IT project management has become even more challenged by an ever-increasing pace of technical development, new standards, new features, product releases, shorter time-to market, and changing customer demands (Bowersox et al. 1999; Taxén and Lilliesköld 2008). Thus, as the nature of usage of various IT applications and services has become more varied, it has become even more vital to understand users when developing new IT applications and services (Iivari et al. 2010).

In contemporary software development, frequent and timely involvement of users throughout the development process is commonly viewed as good practice, leading to increased development productivity and user satisfaction with the system (He and King 2008; Hsu et al. 2012). Indeed, the literature shows that user involvement is one of critical success factors for software projects. The aim of user involvement is to gain more knowledge about users and their context of use of system so as to effectively develop user satisfactory systems (Kujala 2003). A lack of user involvement leads to misunderstanding of the systems requirements, misaligning end-user expectations, and unclear systems' scope and objectives (Schmidt et al. 2001). Users typically have significant knowledge of the application domain, the tasks they perform, work practices, context of the system use and their behavior and preferences. User involvement in Systems Development Life Cycle (SDLC) facilitates understanding of their work environment and can improve the quality, accuracy and completeness of their requirements (Ives and Olson 1984; Kujala 2003). Active involvement of organizational users influences the systems development, which in turn, impacts general systems development criterion outcomes - overall user satisfaction, and systems usage (Barki and Hartwick 1989; Barki and Hartwick 1994). Thus, involving users (i.e., representatives from affected functional units) in all stages of the systems development projects is important (Overby 2003).

In the information system, user involvement is generally referred to as "participation in the system development process by potential users or representatives" (Ives and Olson 1984). However drawing from Psychology, Marketing, and Organizational Behavior, Barki and Hartwick (1989) proposed to define ***user participation*** as "actual behaviors and activities pertaining to the systems development" and ***user involvement*** as "one's perception of the systems in terms of its importance and relevance". So, it is necessary to account for users' mental schema and knowledge of needs and preferences when developing IT systems as well as to understand individual behaviors and what motivates them to exert efforts in the direction of a certain goal (Leonard-Barton and Sinha 1993). Given the need for and importance of understanding how users can best participate (i.e., the activities that users perform in the development process), and what makes users perceive the importance and personal relevance toward the system which may lead to the project success, this study examines how user participation in the development process influences the successful outcome of ISD projects.

Research Problems and Motivations

So far most research focus on user participation and involvement either in the early development phases, e.g. requirement elicitation, or at the end of the development project within user acceptance tests (Iivari et al. 2010; Ives and Olson 1984). Most large-scale IT projects are still using traditional project management and SW development methods such as the *waterfall model* (Austin and Nolan 1998). Despite its *advantages* of high stability and clear agreements on price, timeline and scope, the *drawbacks* come with a long period of waiting for the business side which leads to misinterpretation in translation from user to system requirements (Fowler and Highsmith 2001). As a result, end-users do not feel integrated in the project as well as they do not recognize their requirements in the acceptance phase (Doll and Torkzadeh 1989). This makes a low acceptance of the system and a low motivation to participate in large-scale IT projects by the end-users.

Although software development methods provide various opportunities to include users, it is not clear how user involvement should be integrated with systems development. Markus and Mao (2004) claim that "there is a gap between IS development methods and user involvement". Many traditional approaches or methods emphasizing user participation and involvement such as *participatory design* based on the Scandinavian school, *user-centered design* defined in the ISO standard, failed to point out how exactly (i.e. in which phases, which content, etc.) the user involvement should take place (Iivari et al, 2010). *Socio-technical approaches* to IS development, such as ETHICS (Effective Technical and Human Design of Computer-Based Systems) (Mumford 1997; Mumford 2000) or Multiview (Avison et al. 1990), also make user participation an important part of design.

Recent information system development methodologies attempt to address the need for more effective user involvement; these methods include techniques such as Joint Application Development (JAD), Rapid Application Development (RAD), Information Engineering (IE), agile development approaches, and others. Contemporary Agile software development methodologies (SCRUM, Extreme Programming XP, etc.) promote such frequent and timely involvement of users. Despite this amount of existing research there are still gaps within the different methods and it is still an open question about how user involvement should be integrated into SW development (Lynch and Gregor 2004).

Given the modern, dynamic IS development environment of short-term business needs, Internet, e-commerce, multimedia and mobile applications, packaged software and outsourcing (Barry and Lang 2003; Sawyer 2001; Schmidt et al. 2001), the nature and extent of user participation may well be changing (Markus and Mao 2004). Thus both theoretical and empirical knowledge of the current forms of IS development practice is needed in general (Barry and Lang 2003), including knowledge related specifically to user participation.

The main motivation of this study is to understand the current practices of user participation and involvement in IS development and to contribute to the body of knowledge of how embedded psychological dimensions of user participation in system development contribute to ISD project success.

Research Objectives and Research Questions

The primary objective of this research is therefore to understand ISD project success from the user perspective, by examining the nature and effect of user participation in the development process of IT projects. With the main focus being to advance the extant knowledge of user participation in system development, the objectives of this research are to:

- Identify the factors that influence user participation to the success of ISD project, and
- Develop a comprehensive framework that contribute to a better understanding of IS success phenomenon

The research questions that will help achieve the primary research objective (i.e., understanding the success in ISD projects from the user perspective) are as follows:

RQ1: What are the factors that influence user participation in ISD projects?

RQ2: What are the relationships between user participation and IS success?

Literature Review

User participation has been a prominent research topic in IS for decades premised on its benefits such as (1) improved quality of the system as a result of more accurate user requirements; (2) the prevention of unneeded and costly system features; (3) greater understanding of the system and improved levels of system acceptance by the user; (4) an increase in user satisfaction, which leads to higher system use; and (5) increased participation in decision-making in the organization. Despite these benefits that arise from user involvement, however, there are few common practices currently seen across IT projects that involve users to any large extent (Iivari et al., 2010).

The conventional wisdom within the information systems community suggests that user participation is central to the successful development of information systems. For more than four decades, IS studies have investigated the effect of user participation and involvement on system success [see (Abelein and Paech 2015; Eichhorn and Tukel 2015)]. Despite considerable empirical research, results on the relationship between user participation and involvement, and system success have remained inconsistent (Bano and Zowghi 2015; Cavaye 1995; He and King 2008; Hwang and Thorn 1999; Ives and Olson 1984; Kujala 2003). This raises the intriguing question of whether user participation and involvement is essential for system success. While empirical studies have broadly supported the notion that user participation and involvement in system development ensures system success, various instances of disagreement exist between the researchers on this topic (Bano and Zowghi 2015). It has been argued that the variations in research method designs (Cavaye 1995; Ives and Olson 1984), confounding effects of usage of the terms "user involvement" and "user participation" (Barki and Hartwick 1989; Barki and Hartwick 1994; Cavaye 1995), and other contingency factors (McKeen et al. 1994), may contribute to these inconclusive findings. Given the imprecise conceptualization and inadequate measurement issues resulting in the inconsistent findings, there is no clear reflection of the substantial and cumulative development of user participation and involvement in project success in the existing body of research. In fact, Baroudi et al. (1986) claimed that a major flaw in most of the user involvement studies is their failure to ground their hypotheses in existing theory or to develop new theory to explain the phenomenon observed. Accordingly, researchers have been argued that the relationship between user participation and system success is neither grounded in theory nor substantiated by research data (Butler and Fitzgerald 1997).

In IS literature, the expectation that user involvement will increase system usage and user information satisfaction is consistent with the theory of participative decision making (PDM) (Baroudi et al. 1986; Locke and Schweiger 1979). PDM has been suggested as an appropriate paradigm for investigating user participation in system development (Doll and Torkzadeh 1989; Ives and Olson 1984; Tait and Vessey 1988). Ives and Olson (1984) maintain that user participation is a special case of PDM in which the users and system designers substitute for employees and managers. In this two-party relationship in system development context, participative decision making can be viewed as engaging in activities rather than sharing in decision making (Doll and Torkzadeh 1989). This would suggest that there is a positive relationship between degree of user participation and system acceptance through intervening mechanisms parallel to the ones in the PDM context (such as feelings of system ownership, sense of control, better understanding of system objectives and capabilities, etc.) (Saleem 1996). PDM also contributes to our understanding of the effect of user involvement on system success as involvement may lead to improved system quality as well as increased user acceptance, reflected in increased use of and satisfaction with the system (Tait and Vessey 1988). Generally, a large number of measures have been used in prior studies as surrogates of system success. For example, Ives and Olson (1984) propose system quality and system acceptance as appropriate outcome variables. DeLone and McLean (1992) list system quality, information quality, use, user satisfaction, individual impact, and organizational impact as measures of successful systems.

Two of the most commonly utilized measures of IS success are user satisfaction and system use (Ginzberg 1979; Melone 1990). *System use* refers to "the degree and manner in which users utilize the capabilities of an information system", for example, amount of use, frequency of use, extent of use, nature of use, appropriateness of use, and purpose of use (Petter et al. 2008). *User satisfaction* refers to "the extent to which users feel target system or its deliverables meet their needs, requirements, and expectations" (Olson and Ives 1981). While system use is employed as an appropriate measure of system success when use is discretionary or voluntary (DeLone and McLean 1992), user satisfaction seems the preference of most IS researchers especially when information system use is mandatory (Ives et al. 1983; Melone 1990; Swanson 1987).

Literature review suggests a range of practices and attitudes in terms of user participation and involvement. Given the significant changes in the nature of system development projects, technology, business environments, and the IT knowledge of users over the four decades, it would be timely to undertake research aimed at providing a current view of ISD project success. In order to understand the user participation phenomenon in information system development, this study adopts participative decision making (PDM) theory to examine what factors influence user participation and how user participation affects ISD project success.

Participative Decision Making

Participative decision making is defined as a process in which influence is shared between superiors and their subordinates (Mitchell 1973; Wagner and Gooding 1987) or as joint decision making (Vroom 1960). PDM refers to group decision making in which employees who are to execute the decisions or who are affected by the decisions, participate in the decision-making process. The *goal* of participative decision making (PDM) is to increase inputs of subordinates into management decisions that are related to their jobs. Expected *benefits* fall into 2 categories: increased job satisfaction and improved productivity (Locke and Schweiger 1979).

Locke and Schweiger (1979) developed a framework to explain the psychological basis of participation's effects on satisfaction and productivity. The framework describes three psychological mechanisms (cognition, motivation, and value attainment) by which PDM bring about these expected benefits. *Cognitive mechanisms* refer to increases in information, knowledge, understanding and creativity that PDM can facilitate to bear on organizational problems. Through cognitive mechanisms, participation by users may enhance productivity or system quality through improved communication or better understanding of information. *Motivation mechanisms* reduce users' resistance to change and enhance users' acceptance of or commitment to decisions and changes. Lastly, *value attainment* refers to whether individuals get what they want (accomplish their objectives or attain their values) through participation. Thus, the effects of participation are a function of an individual's attainment of his or her values. Value attainment leads directly to morale and satisfaction and, through increased satisfaction affects

productivity as well. PDM research further suggests a contingent approach to decision making and that its effectiveness depends on a number of contextual factors, level of knowledge of employees, motivation of employees, organizational factors, task attributes, group characteristics, and leader attributes.

Research Framework and Propositions

Based on the literature review, a PDM based framework is developed with the influential factors of user participation in the literature that are related to psychological mechanisms of PDM in contributing to IS success such as *user characteristics (computer experience, hands-on activity) and user-IS interaction* as cognitive mechanism; *user responsibility* as motivational mechanism; and *user influence* as value attainment mechanism as shown in Figure 1.

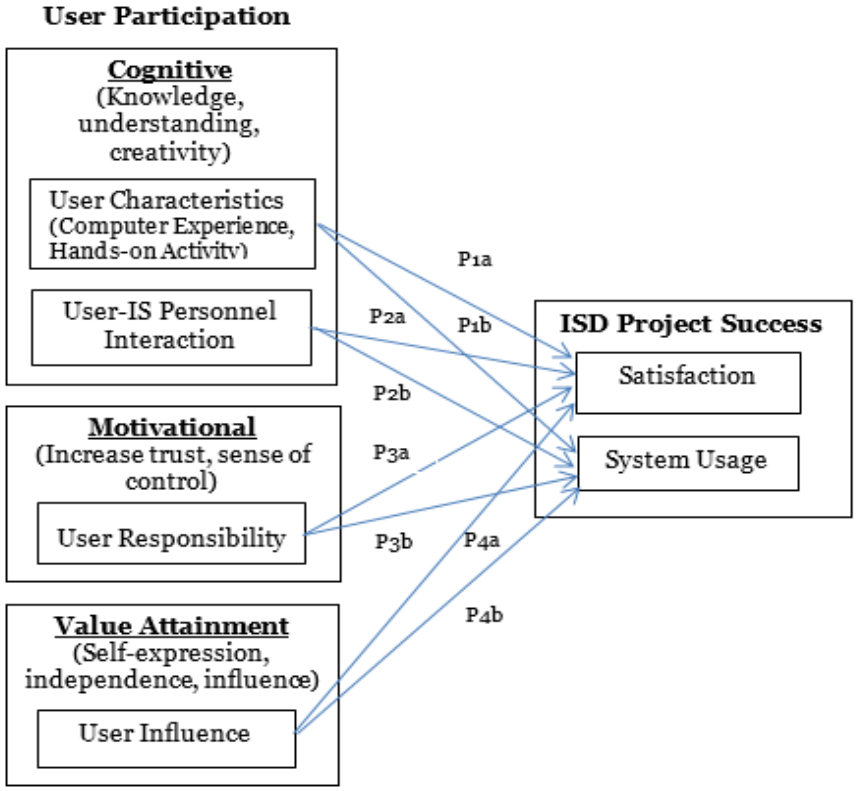

Figure 1 A Framework for the Effects of Psychological Mechanisms of User Participation on ISD Project Success

Cognitive Mechanisms

The selection of the cognitive mechanisms [***user characteristics*** (e.g. computer experience, hands-on activity); and ***user-IS personnel interaction***] is based on earlier research on user participation (Hartwick and Barki 1994; Iivari and Igbaria 1997). Cognitive mechanisms enhance productivity efficiency in 2 ways: (1) participation may enhance the job skills and understanding of the system; and (2) participation may improve communication and enable better utilization of information (Locke and Schweiger 1979).

First, ***user characteristics*** refer to ability that enables the users to participate as a member of the systems development team and accomplish the goals of project, e.g., *computer experience* – user's knowledge and skill related to proposed system (Chang et al. 2010), and *hands-on activity* – specific physical design and implementation tasks performed by users (Hartwick and Barki 1994). Doll and Torkzadeh (1989) suggest that participation is more effective when individuals have relevant skills and

information, and perceive that their participation will affect the outcomes. Alavi and Joachimsthaler (1992) justify that user experience form the most important mechanism for improving DSS success. According to PDM (Locke and Schweiger 1979), working through cognitive mechanism user participation could be expected to improve user understanding and design quality, leading to enhanced satisfaction and system usage. Thus, we posit that:

Proposition 1a: Through cognitive mechanism, user characteristics (computer experience, hands-on activity) are positively associated with user satisfaction.

Proposition 1b: Through cognitive mechanism, user characteristics (computer experience, hands-on activity) are positively associated with system usage.

Second, participation may improve communication and enable better utilization of information through cognitive mechanisms. Communication between IS units and users facilitates user-IS personnel interaction. ***User-IS personnel interaction*** is the relationship between IS staff and users to achieve a common purpose via information sharing and coordination of activities during the development process (Baroudi and Orlikowski 1988; Chang et al. 2010). Effective communication works to the benefit of both users and IS developers.

In the context of IS project development, user–IS personnel interaction is required to blend users' requirements and IS knowledge. Through communication, users convey their understanding and insight of business practice accurately and completely to developers who in turn, receive this information and translate it into a working computer system (McKeen et al. 1994). To make decisions, users need to understand problems and solve them with IS developers. Solving problems together forces active interaction as a part of a formal or informal communication process, and improves system design. Without such interaction, projects are unlikely to attain success (Chen et al. 2011). According to PDM (Locke and Schweiger 1979), cognitive mechanisms enhance end-user satisfaction through improved design and better utilization. Thus, second propositions are:

Proposition 2a: Through cognitive mechanism, user-IS personnel interaction is positively associated with user satisfaction.

Proposition 2b: Through cognitive mechanism, user-IS personnel interaction is positively associated with system usage.

Motivational Mechanism

User responsibility refers to the activities and assignments reflecting a user's overall leadership or accountability for the ISD project. For example, user being a project team leader, having responsibility for system success, hardware or software selection, costs, or funds (Hartwick and Barki 1994)

According to Chen et al. (2011), user responsibility ultimately makes users accountable for specific elements of project success. Responsibility not only contributes to a general experience of *trust*, but also creates a propensity to trust between users and IS personnel. Trust enables individuals to deal with task uncertainty, and reduce the uncertainty. Individuals that trust each other are likely to conquer their own needs and egos in pursuit of a common goal (Mayer et al. 1995). Furthermore, encouraging user participation by assigning them responsibilities for system development might create a sense of control of the IS project. The sense of project ownership energizes users to communicate with IS personnel and be involved in system development activities. Specifically, users are more likely to actively participate in controlling the project by taking specific responsibilities for the project (Chen et al. 2011).

According to PDM (Locke and Schweiger 1979), the benefits of motivational mechanisms by participation are attributed to greater trust, greater sense of control, greater identification with the organization, and higher goals, which will reduce resistance to change and enhance user acceptance/commitment. Thus participation through motivational mechanisms contributes to user satisfaction and system usage. This lead to the third propositions:

Proposition 3a: Through motivation mechanism, user responsibility in system development process is positively associated with user satisfaction.

Proposition 3b: Through motivation mechanism, user responsibility in system development process is positively associated with system usage.

Value Attainment Mechanism

User influence refers to the extent to which members of an organization affect decisions related to the final design of an information system (McKeen et al. 1994).

Through participation in system development activities, users can exercise influence over the design of the system. Without certain degree of participation, there can be no influence (McKeen et al. 1994). Where users are able to influence logical design of the system, they attain their values. And if actual influence in the design process is what the user wants, satisfaction and system usage may depend upon the user's perception of their value attainment. Previous research shows that a high degree of participation by project stakeholders, specifically user influence, improves the success rate of ISD outcomes (Kendall and Kendall 2010).

According to PDM (Locke and Schweiger 1979), value attainment leads directly to morale and satisfaction and, through increased satisfaction affects productivity (system usage) as well. Thus we have the fourth propositions:

Proposition 4a: Through value attainment mechanism, user influence in system development process is positively associated with user satisfaction.

Proposition 4b: Through value attainment mechanism, user influence in system development process is likely to enhance system usage.

Research Contributions

This study attempts to shed light on the importance of intellectual contributions of user participation in developing ISD projects. The study outcomes will draw the attention of IT project managers, the IT development community, the user community, potential adopters and sponsors of IT applications, IS researchers and scholars. Accordingly, this study contributes to project management and information system research in the following ways:

For academia, it will contribute to the theoretical contribution in *participative decision making research* by developing a comprehensive framework for future studies concerning the user perspective in participative system development that reveals the factors influencing user participation and the effect of user participation in contributing ISD project success. This study may help researchers determining what psychological state can be produced by user participation in different dimensions.

For practice, this research will provide project managers with a greater understanding of how to successfully manage ISD projects in reference to people-related factors (i.e. user participation). By acquiring a better understanding of the phenomenon of user participation and its effects, IS practitioners will be able to better consider how user construct should be implemented in practice. *For example,* user department managers may become more aware of the importance of effective user participation in project development, in turn allowing them both to make more careful selection of user representatives and stipulate active participative behaviors from users during the development process. Furthermore, management may want to foster an atmosphere that facilitates users perceiving the importance of, and enhance their favorable attitudes towards, IS development to facilitate user involvement in developing ISD projects. The findings from these relationships will have valuable implications for organizations that are interested in adopting ISD projects for satisfying users' needs and achieving business objectives.

Conclusion

The importance of user participation will continue to grow as various system development projects are accelerating, thus how to improve ISD project success via effective user participation will remain central to IS success research. Given that the IS development context continues to change, further empirical analysis should provide valuable insights into the stability or otherwise of these practices and attitudes. It is hoped that this study will shed light on the importance of research in understanding different psychological dimensions of user participation in system development. The PDM based framework of this study provides the basis for further empirical research.

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