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3-22-2019

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ABSTRACT

User participation and involvement (UPI) are complex concepts with many factors. This complexity stems from the different ways in how users are defined, how they participate and are involved, from the characteristics of the system, and the various phases within systems development. Managing UPI is important to change agents, i.e., managers, information technology experts, and consultants because they are the ones who are tasked with choosing the best participants at the right time to contribute to the systems development process to ensure a successful system. By reviewing relevant literature, this paper examines when participants should not participate in specific phases of systems development so as to not impede success or contribute to the failure of the systems development project.

Keywords

Information systems development**,** user participation, user involvement, system failure

INTRODUCTION

In information systems development, user participation and involvement (UPI) are generally viewed as essential for systems success (Harris and Weistroffer, 2009; Iivari et al., 2010). Despite this wide consensus, there is no actual proof that a causal relationship exists between UPI and systems success (Alter, 2009). Moreover, there are documented cases where users were involved or participated in the systems development and the system was still deemed a failure, and there are cases where users were not involved in the process and the system was considered a success (Cavaye ,1995).

User participation and involvement as well as systems success are complex concepts with many factors (Petter et al., 2007). The complexity of UPI stems from various ways in how users are defined, how they participate or are involved, from the characteristics of the system, and the different phases within systems development. Managing UPI is a serious challenge for change agents, i.e., managers, experts, consultants, or vendors, because they are the ones who are tasked with choosing the right participants at the right time to contribute to the systems development process to ensure a successful system.

Most of the literature regarding UPI focuses on including the participant (viz. user) in every stage of the systems development process; however, it may not always be beneficial to have the user participate. There are times when participants may not need to participate because their input may be more of a hindrance to the process than a benefit. Hence, the motivation behind and the premise of this study and literature review. The authors focus on the negative effects of various participation activities at various stages in the process when those activities are no longer effective and become hindrances to the success of the system's development. As such, the following research question is posed: *When and at what phase are relevant participants' participation in a system's development process irrelevant and, therefore, may be a contributing factor to the possible failure of that system?*

This paper will proceed as follows: First, several terms and concepts are defined and explained. Next, our literature review approach is described. This is followed by the results of our review and a discussion thereof, and several propositions regarding when participants should be excluded from the systems development process. We end with conclusions, contributions, limitations, and possible future work.

DEFINITION OF TERMS AND CONCEPTS

Users and Participants

In most systems development research, the user is monolithic, assumed to be some end-user employee or operational person (Markus and Mao, 2004) or any nontechnical individual in the organization, such as a manager, who is affected by the system (Carmel et. al., 1993; Jarvenpaa and Ives, 1991). However, the user description has become more expansive due to user participation practice and factors like user representation, type of participation, and methods and frameworks for UPI (Markus and Mao, 2004). As such, in this paper the user concept is redefined as the participant. This participant may be a member of a subgroup of stakeholders, where a stakeholder is anyone who is likely to be affected by the system. As stated by Markus and Mao (2004), stakeholders and participants can be employees, managers, end-users, customers, supplier, etc., all of who are

affected by the system differently because their needs are different. This of course has implications for systems development. Consequently, change agents, i.e., managers, information technology experts, consultants, or vendors, are tasked with choosing the best participants to contribute to the success of the systems development project, or better yet, to understand when each participant is needed or is irrelevant within each phase of the process.

Participation and Involvement

In much of the literature, the terms user participation and user involvement are used to describe the same activity. Barki and Hartwick (1994), however, specifically delineate the terms, describing user participation as "behaviors and activities users perform in the system development process" and user involvement as the "psychological state of the individual, defined as the importance and personal relevance of a system to a user." Both activities have been credited with contributing to the success of the system (McGill and Klobas, 2008). However, according to Barki and Hartwick (1991), "The role of user participation in achieving system success may be less than has been generally believed." According to Cavaye (1995), participation can be described in six dimensions:

1. Type of participants: Participants may be all the relevant stakeholders or just a representation of these (Ives and Olson 1984; Markus and Mao, 2004; Mumford 1979, 1981).

2. Degree of participation: Participants may have sole responsibility of signing-off on various stages in the process or merely provide insight at various stages (Ives and Olson, 1984; Markus and Mao, 2004).

3. Content of participation: Participants can contribute to the systems development process by providing different aspects of expertise. Some participants may be more technical than others and contribute to the actual design of the system, and some participants may contribute to how the data should be processed (Hirschheim, 1983; Markus and Mao, 2004).

4. Extent of participation: Participants may provide the requirements of the system or included in the testing of the system (Ginzberg, 1981; McKeen, 1983).

5. Formality of participation: Participants may be involved in a formal, organized way, or they may be involved in an informal, impromptu way (Barki and Hartwick, 1994).

6. Influence of participation: Participants may have significant impact on the systems development process or none (Ives and Olson, 1984; Markus and Mao, 2004; Mumford, 1979).

Development Phases

Multiple development methods exist with various development phases or disciplines in which to include participants. For example, with traditional methods like waterfall, the participants only participate in the requirements definition and validation process. With rapid application development, participants' participation is throughout the design and development phases by evaluation of prototypes. Lastly, with agile development approaches, participants participate intensively throughout the whole process as part of the team. However, all methods utilize the same basic phases (or disciplines), though these may not be specifically designated as phases or may be repeated in multiple iterations. For our purposes, we divide the systems development process in just two high level phases:

Systems analysis and requirements definition: Defines functions and operations of the intended system. It is the process of gathering and interpreting information, diagnosing problems, and recommending improvements to the current system. Analyzes end-user information needs and removes inconsistencies and incompleteness in the user requirements.

Systems design: Describes desired features and operations in detail, including screen layouts, system processes, hardware configurations, data formats, and other specifications.

System Failure and Success

Though generally researchers focus on how to make systems successful, the approach in this paper is to focus on failure. This is because failures afford us a better understanding of what not to do, and sometimes we learn more from what not to do than from what to do. With that in mind, we summarize various researchers' different views of systems' failure.

Lyytinen and Hirschheim (1987) offer four categories of failures in information systems development (ISD) projects:

1. Correspondence failure: The design objectives are not met by the completed system
2. Process failure: The systems development project is over schedule or over budget
3. Expectation failure: The new system does not meet stakeholders' requirements, expectations or values
4. Interaction failure: The system is not used as expected and thus does not provide the expected business value

Sauer (1993) states failure occurs only when the system is completely abandoned. The premise is that all systems are imperfect; therefore, it is up to the owners/users to either invest further funds to fix the system or accept its limitations and use it as is.

Flowers (1996) views an information system as failed if:

1. The system as a whole does not operate as expected
2. The overall performance of the system is sub-optimal
3. The system does not perform as intended or is user-hostile and rejected by users and therefore underutilized
4. The cost of the development exceeds the benefits throughout the system's useful life
5. The development project is abandoned before it is completed, due to complexity or bad management

METHODOLOGY

We examine the empirical literature on user participation in systems development, specifically when this participation is not useful and can potentially contribute to system failures. Variations of the following key terms were used for the literature search: user participation and systems development failures; user participation and systems development problems; user participation and systems development challenges; user participation and systems development issues; user participation and systems development dissatisfaction. In addition, end user and stakeholder terms were used in place of user participant. Most studies either interchange the terms user participation and involvement or use both terms as one phenomenon. However, for this study only studies dealing with user participation and negative outcomes (i.e. a mapping to potential system failures) are considered. The articles are from both peer reviewed journals and conference proceedings. It should be noted that none of the studies focused on user participation in a negative way. The negative outcomes were just an unexpected result of the studies.

LITERATURE REVIEW RESULTS

Hirschheim (1985)

Hirschheim (1985) conducted qualitative research using 20 semi-structured interviews to uncover the experiences and opinions of those who were most knowledgeable about participative design. Individuals who had been engaged in one or more participative exercises in their organizations were the primary sources. Additionally, informal discussions and observation were used to supplement the semi-structured interviews.

From the study, a number of respondents felt participative systems design may be impractical to use for small systems. Also, one respondent observed that participative systems design worked better with higher grade staff that are more interested in their jobs and on improving their work situation through participation. Another problem mentioned by a number of respondents was that the participative approach leads to delays in the design phase. For participative systems design to be practical then, the delays must be offset by a relatively problem-free and quick implementation. Another difficulty experienced was that some problems, which arise during the design phase, might not be resolved quickly, and the technical systems designer may be unproductive during this time. Although participative systems design facilitates active feedback to reflect the real needs of the users, it was claimed that too much time was spent on minor issues. An additional issue found was difficulty in persuading and convincing all concerned that participative systems design was feasible, especially when the participation was novel to the organization. People were initially suspicious and skeptical about the process. Finding sufficient time and opportunity to bring people together for discussion and consultation was also difficult. The size of the design group was an important factor in determining the success of the approach. Too large a number of members in the design group (e.g. 10 or more people) resulted in problems of coordination and control, giving the participants the feeling of not making progress. Last but not least, one organization found it difficult to decide on the most appropriate time to introduce participation in the development process. If participation is advocated at an early stage, many users may not be able to conceptualize a system not yet in existence; but introducing it at a later phase may result in the users feeling left out.

Hawk and Dos Santos (1991)

Hawk and Dos Santos (1991) conducted a cross-sectional field study on 51 information systems in 18 organizations, recording descriptive statistics for the organizations and systems. The number of employees in the sample organizations ranged from 600 to 12,000, with an average of 2800. Although the characteristics of the systems indicate diversity in terms of number of users, only two systems had more than 300 users, and all but seven of the systems had 150 or fewer users. Systems development managers in each organization were contacted and asked to identify information systems developed for end users that had been in use for more than 6 months and less than 24 months. The intent was to include systems that had sufficient time for the resolution of most installation problems, and that events surrounding systems development were recent enough to be remembered.

The study attempted to determine the impact of user participation and user leadership during system development on user information satisfaction. It also sought to determine whether system type and user level affected the impact of participation and leadership on user information satisfaction. The study reported that user information satisfaction increased with increasing participation when the system was used for decision support but decreased when the system was used for transaction processing. This may be due to the fact that for systems that support decision-making, user requirements often can only be obtained from users. Hence, user participation will result in systems that better meet user needs. When use of a system is for transaction processing, however, user needs can be determined without user participation, such as via observation, review of existing systems, etc. The authors suggest that the negative relationship between user participation and user satisfaction may possibly be explained by ineffective user/analyst communication that can negatively impact system success, and that perhaps the negative impact of substantial user/analyst interaction is not offset by a corresponding improvement in requirements determination for transaction-processing systems.

Heinbokel et al. (1996)

Heinbokel et al. (1996) conducted a longitudinal field study of 29 commercial software development projects. They analyzed the pros and cons of user-centeredness in the software development process by looking at two concepts: user participation, involving a user representative on the development team; and user orientation, a cognitive-emotional concept pertaining to positive attitudes towards users. Both were found to be associated with project difficulties relating to process and product quality as well as overall project success.

In the study, the authors found that users often feared job loss or worsened working conditions as a result of the new software and, therefore, were not interested in participating constructively, which might have led to misinformation. Furthermore, user representatives were often unpredictable. In one project, late in the development process, users demanded a direct manipulation interface, which they had just seen with a new application. In another case, a user representative demanded changes at the time that developers wanted to start testing the software. This type of intervention may have disrupted the software development process. Overall, the authors concluded that projects with high user participation showed lower overall success, fewer innovations, a lower degree of flexibility, and lower team effectiveness. They also indicated that the negative features associated with user participation do not become apparent immediately but only later in the process, which can lead to system failure.

McKeen and Guimaraes (1997)

McKeen and Guimaraes (1997) attempted to identify which specific participative behaviors are actually used during the systems development process and to determine the relationship between these behaviors and user satisfaction in different contextual situations. Eight Midwestern U.S. organizations participated in the study. The sample consisted of four manufacturers, a bank, an insurance company, a retailer, and a transportation company. These were large organizations; two had gross revenues less than $500 million, three had gross revenues between $500 million and $1 billion, and three had gross revenues in excess of $1 billion. Each organization had a large information systems (IS) department with many ongoing system development projects of varying sizes. The point of entry in each organization was the senior IS officer. Each site was asked to provide information on their twenty most recently developed applications by the IS department. These were all mainframe (or minicomputer) applications with varying degrees of end-user participation. All projects were developed by systems analysts and under IS department operational control (i.e. traditional systems development). Of the 160 applications studied, nine were excluded because the information was either incomplete or unavailable. The final sample size remained at 151. Data were collected from two sources: the project leader in charge of development and the primary end users of each system. In some cases, additional contacts were made in order to acquire or verify these data. All data were collected by the authors via brief interviews and questionnaires to users and developers. Two types of situations were analyzed – those with a high need for participation and those with a low need for participation. The assessment of need for participation was based on the composite measure formed by averaging the measures of task complexity and system complexity. The sample was split at the median of the need for participation measure.

The authors found that fifteen specific behaviors were significantly related to user satisfaction over the entire sample. Many of these behaviors were not significantly related to user satisfaction where there was a low need for participation. Involving users heavily in projects with low task complexity seems to be unnecessary since involvement in the activities beyond the four significant ones does not increase the level of satisfaction. Results from the high-need group were in sharp contrast to those from the low-need group.

DISCUSSION

The research question, *"When and at what phase are relevant participants' participation in a system's development process irrelevant and, therefore may be a contributing factor to the possible failure of that system?"* has been answered to some extent, albeit based on a small sample of published studies. From the findings, it appears that under certain circumstances, user

participation is not warranted, as shown in the following propositions and in Table 1.

Proposition 1: When systems are small, and the cost is high, the participant will likely not be able to add much to the design phase. Requiring the participant to participate will add to the cost of development and not provide any additional benefit, therefore contributing to the cost exceeding the benefit.

Proposition 2: When there are large numbers of participants, then it is better not to have them all participate in the requirements definition phase because it will be difficult to control and coordinate all the different viewpoints which will potentially lead to the systems development process failure.

Proposition 3: When an entirely new system is being developed, participants may not understand the benefits of it. Their participation may lead to expectation failure and correspondence failures.

Proposition 4: When a standard system (e.g. a transaction processing system) is being developed, participants may bring an expectation to the system's requirements and design, which is not warranted or economically feasible.

Proposition 5: When participants do not readily see the benefit of the system or may even see it as a threat to their position, there is little benefit to have them participate at the analysis or design levels. They may not be honest due to preconceived ideas of how the system will impact their job; in other words, they will form expectations that will not align with the actual system and may possibly sabotage the development process.

Proposition 6: When participants at the beginning phases appear to be unpredictable or indecisive in their participation, it may not be beneficial to have them participate in the systems design phase as they might delay the development process and contribute to going over schedule and thus cause process failure due to wanting to go back and redo previous phases.

Proposition 7: When the system being developed is complex, but the contribution of the participants is low, then participants participating in the requirements definition and systems design phases may be detrimental, as their contributions will add more to the cost than to the benefit of the system.

Study	Prop.	Issue/Problem	Systems Failure Type	Dimension of Participation	Phase
Hirschheim (1985)	1	Small Systems and High Cost	Cost Exceeds Benefit Failure (Flowers 1996)	Participant Representative	Design
	2	Delays due to Coordination and Control Issues	Process Failure (Flowers 1996)	Large Number of Participants	Design
	3	Novel System and Unsure of System Benefits	Expectation and Correspondence Failures (Lyytinen & Hirschheim 1987)	Participant Representative	Analysis/ Design
Hawk & Dos Santos (1991)	4	Requirements Can be Determined via Observation and Review of Existing System	Expectation Failure (Lyytinen & Hirschheim 1987)	Participant Representative	Analysis/ Requirements/ Design
Hirschheim (1985) Heinbokel et al. (1996)	5	Fear of Job Loss and Lack of Interest	Expectation Failure (Lyytinen & Hirschheim 1987)	Participant Representative	Analysis/ Design
Heinbokel et al. (1996)	6	Desire to Change Something in the Wrong Phase	Process Failure (Flowers 1996)	Participant Representative	Design
McKeen & Guimaraes (1997)	7	Low Task/High Systems Complexity and Seen as an Unnecessary Use of Participants' Time	Cost Exceeds Benefit Failure (Lyytinen & Hirschheim 1987)	Participant Representative	Analysis/ Design

Table 1. Propositions

CONCLUSION, CONTRIBUTION, AND FUTURE WORK

There are few studies specific on user participation being irrelevant or detrimental to systems success, however, we feel that the ones that do exist offer some useful insight. As such, the contribution of this study is to provide a different way of looking at participants' participation contributions, or the lack thereof. It is the hope of the authors that this paper and our propositions will help practitioners (i.e. change agents) be more successful in determining the best times to exclude participants from the systems development process and consequently, improve chances of systems development success. The propositions are preliminary, but may serve as a basis and motivation for more research.

The main limitation of this paper is that very limited relevant literature was found, and those studies we did find are fairly old. Also, no studies were found that directly investigate participants' contribution to failures of systems development. The lack of published studies in this area, of course, makes for an opportunity to do further research. Further examining how participants may actually contribute to the failure of a system may provide useful insight.

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