

Involving End Users to Mitigate Risk in IS Development Projects

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ABSTRACT

In this paper we aim to gain insight into the relationship between user participation modes and project risk factors, and then we construct a model that can be used to determine how user participation can be successfully applied in ISD projects with a given set of risk factors. We perform an in-depth literature review, which aims to clarify the concept of user participation as part of risk management. We then report on the results of a case study in Cap Gemini where we conduct an exploratory research of the application of user participation in practice. For this exploratory research, a quantitative and qualitative research method was designed in the form of a survey and interviews. Through the results from our case study, we gain insight into the relationship between user participation and IS project risk and also determine how user participation can be used to mitigate such risk.

Keywords: End User Participation, User Involvement, Is Development, Risk

1. INTRODUCTION

A great deal of research has been done on what causes high rates of failure in Information System Development (ISD) projects, and on how they can be prevented. One of the most important causes for failure found in these researches is the lack of user participation in ISD projects (*CHAOS Chronicles*, 2003; He & King, 2008; Ives & Olson, 1984). User participation can be defined as the “participation in the system development process by representatives of the target user group” (Ives & Olson, 1984), p. 587) and is extensively covered in Information System (IS) literature (Garrity, 1963; King & Cleland, 1971; Steinbart & Accola, 1994). In fact, Hwang and Thorn (Hwang & Thorn, 1999) even state that it is the most widely discussed topic in IS literature. One might expect that all this research had resulted in a clear understanding of the concept of user participation, its application and its results. However, and unfortunately, this is not the case; studies on the effect of user participation on system outcomes are inconclusive and often contradicting (Ives & Olson, 1984; Lynch & Gregor, 2004), and the issues of when user participation should be applied and how user participation should be organized, are often vaguely covered and mostly separately in different articles.

The application of user participation in ISD is another topic without a clear understanding in literature. In this perspective, *who* should participate and *how* should the user participation be applied in ISD projects is unclear from literature. The question of *who* should participate has not received much attention in literature (Choe, 1998; Hsu, Chan, Liu, & Chen, 2008; Yetton, Martin, Sharma, & Johnston, 2000). There is not much consent among the authors who do discuss it, as answers to this question vary, from involving only a few expert users (Hwang & Thorn, 1999), to involving all stakeholders of the new IS (Doll & Deng, 1999). The ‘how’ question refers to the phases of the ISD process in which users should participate, as well as the role of the participating users in these phases (Lin & Shao, 2000; Lynch & Gregor, 2004). The suggestions given by different authors diverge. Some authors, like Yetton et al. (2000), suggest that users should participate in the requirement phase, so they have a large influence on the functionality of the system. Other authors, like Hsu et al. (2008), suggest that users should participate in reviewing the system, so that they can check the systems usability and indicate whether the system meets the expectations. Choe (1998) proposes that users should not participate in the technical phases, because their lack of technical know-how can only impair the process. On the other hand, other authors suggest that users should participate in all project phases in order to maximize the user satisfaction (Lin & Shao, 2000; Lynch & Gregor, 2004). There is also no consensus on the results or effect of user participation in ISD projects. Researchers find different results (Brodbeck, 2001; He & King, 2008; Heinbokel, Sonnentag, Frese, Stolte, & Brodbeck, 1996; Ives & Olson, 1984; McKeen, Guimaraes, & Wetherbe, 1994), and, although most are positive, there is still a lack of consistent empirical data to support these claims (Gallivan & Keil, 2003). Hence, effect of user participation on project success is under-researched and there is an incomplete understanding of the kind of user participation and the impact of such user participation on the success of an ISD project.

In their attempt to develop an integrative contingency model for software project risk management, Barki et al. (2001) identified user participation as one of the three key dimensions of a risk management profile, the other being formal planning and internal integration. They have shown that a better fit between the level of risk exposure of a software project and its management profile will result in a higher project performance. Although the model of Barki et al. (2001) is a clear and intuitively appealing model, it has some limitations; most notably in describing the actual project risks and risk management in detail and then describing the relation between the two.

In this research we take the model of Barki et al.(2001) as point of departure and focus on the relationship between the risk exposure – user participation fit and project performance. By doing so, the limitations of the model proposed by Barki et al. (2001) will be addressed. We also answer the questions of *who* should participate and *how*. Hence, we tackle two research goals in this paper; (i) to gain insight in the relationship between user participation modes and project risk factors, and their effect on project performance, and (ii) to construct a model that can be used to determine how user participation can be successfully applied in ISD projects that contain a given

set of project risk factors. Here, we use Barki et al. (Barki, Rivard, & Talbot, 1993)'s definition of the term project risk; they define it as the uncertainty surrounding a project and the magnitude of loss due to failure (Barki, et al., 1993).

The rest of the paper is structured as follows; in the next section we review the available literature in order to create a clear and practical model, section 3 describes our conceptual model, section 4 discusses our case study at Capgemini, section 5 describes the results and finally in section 6 we discuss the results and conclude.

2. LITERATURE REVIEW

In this section we endeavour to gain a better understanding of our first research goal, namely, to gain insight in the relationship between user participation modes and project risk factors, and their effect on project performance. We split this goal into its two constituent parts; user participation modes in ISD projects and ISD project risk factors. We hence review the available literature in order to create a clear and practical model (second research goal) that can be used to determine when user participation should be applied, how user participation should be applied, and what results can be expected from the application of user participation. For each of the three goals we perform a systematic literature review, and present the result of the review in the form of a detailed concept matrix (Webster & Watson, 2002).

2.1 Modes of User Participation

The first question we try and answer with the literature review is: *What are the possible user participation modes?* This section is not seeking to identify all possible user participation modes individually, but rather seeks to identify the different factors involved in user participation. In order to identify all factors of user participation modes and to operationalize the user participation part of the conceptual model, Table 1 provides an overview of the aspects of user participation modes touched upon by the different articles. There are only a few authors that provide concrete information on how user participation should be applied or what the factors of user participation are. Most authors do provide a suggestion in which project phases user participation could be applied, but omit who should participate in these phases, and what it is they should do when participating. Lynch and Gregor (2004) are the only authors to propose a comprehensive framework that also discusses the selection of users for user participation and their role in the ISD project. In their framework for user influence on system features, Lynch and Gregor (2004) split user participation modes into *type of user participation* and *depth of user participation*. Together, these two factors determine the *degree of influence* the users have on the ISD project. We have used this classification, along with the type of user ("who") to describe the literature in Table 1.

(i) Involved Users

For the factor 'involved users', six groups are identified. These groups were identified partly from the users defined in the RUP literature (Kruchten, 2004) and partly from conversations with

engagement managers at Capgemini. These identified groups are: Senior management, Middle management, IT management, End users; IT maintenance and Domain experts.

(ii) Depth of user participation

The second aspect determined by Lynch and Gregor (2004), is the depth of user participation. A category value is assigned for this aspect, based on the level of three factors: (i) *Stage in development process*; refers to the phase(s) of the ISD process the users are participating in, (ii) *Frequency of interaction*; refers to the frequency of interaction between the development team and the users, rated from one-off to on-going, (iii) *Voice/views considered*; refers to the impact of the users’ view in the ISD process, whether their voice was considered by the ISD project team. The factors proposed by Lynch and Gregor (2004) provide a classification the type and depth of user participation. However, these factors provide no answer to the third question: ‘*who should participate?*’ In order to answer all three questions, the two factors from the Lynch and Gregor (2004) framework, together with the factor ‘*involved users*’ are combined into the user participation mode construct of the conceptual.

(iii) Type of user participation

The types of user participation refer to the proportion of users that participate in the ISD projects. Based on Mumford’s (1979) classification, Lynch and Gregor (2004) identify three types of user participation, which are also used in the work of Lin and Shao (2000). From least to most direct, these types are: (i) *Consultative*; The ISD team consults some users. These users are selected because of their particular knowledge, position in the organization, (ii) *Representative*; Users who are representatives for the user group are selected to participate in reference groups. (iii) *Consensus*; this type of participation aims to reach consensus amongst all users or at least a very large number of users. These user participation types provide a more in-depth description of the ‘*who*’ aspect described in the beginning of this paragraph, and will be used as such throughout the research.

Author	U.P. Mode	Involved Users	Depth of User Part.	Type of User Part.
Choe, 1998 (Choe, 1998)	Involve users in requirement phase and design & implementation phase		X	
Hsu, et al. (Hsu, et al., 2008)	Involve end users Involve in review of IS		X	
Lin and Shao (Lin & Shao, 2000)	Involve in planning, analysis, design, testing, and implementation. Type of involvement: consultation, representation, consensus Extend: consultative -> consensus	X		X
Lynch and Gregor (Lynch & Gregor, 2004)	Degree of user participation = type & depth Type: consultative (of some users) representative (reference group/testing group, selected users) consensus (working group with many users)	X	X	X

	Depth: stages of the process frequency voice considered						
Rondeau et al. (Rondeau, Ragu-Nathan, & Vonderembse, 2006)	Use cross-functional teams					X	
Wagner and Piccoli (Wagner & Piccoli, 2007)	Only involve users in topics that are important to them at that time. Elaboration likelihood: users must both be motivated and able to process information	X				X	
Yetton et al. (Yetton, et al., 2000)	Involve in project definition and design					X	

Table 1: User Participation modes in literature

Author	Risk Factor	Comment	TC	OC	PS	OD	I/UR
Barki et al. (Barki, et al., 2001)	Risk Exposure (probability of occurrence multiplied by the costs of occurrence)	User participation is part of the management mode that can be chosen to combat risk exposure.					
Blil et al. (Blili, Raymond, & Rivard, 1998)	Task uncertainty, competence		X			X	X
Choe (Choe, 1998)	Organization type	Organic (high)/ mechanic(low)		X			
Hardgrave et al. (Hardgrave, Wilson, & Eastman, 1999)	Innovativeness of the IS; impart of IS on organization, number of users, developer experience with project.		X		X	X	X
He and King(He & King, 2008)	Organizational context and ISD context			X			
Hsu et al. (Hsu, et al., 2008)	Changing business environment & evolving processes resulting in uncertainty					X	X
Lin and Shao(Lin & Shao, 2000)	System impact, system complexity, development methodology	System impact reduces user attitude, outsourcing reduces user involvement	X	X			
Lynch and Gregor (Lynch & Gregor, 2004)	Voluntary use of IS by users & Availability of knowledge with developers	If users are free to choose whether to use the system, involvement is beneficial. Also, when information for the system is only present with users, involvement is necessary.	X	X		X	
Rondeau et al. (Rondeau, et al., 2006)	IS complexity		X				
Wagner and Piccoli (Wagner & Piccoli, 2007)	Project size, impact on users	Users are more committed to participating in the project once it starts affecting their work. Before and after that, they don't pay much attention.		X	X		

Table 2: Literature overview of the risks in ISD projects (Legend: **TC** – Technical Complexity, **OC** – Organizational Complexity, **PS**- Project Size, **OD** – Overambitious Demands, **I/UR** – Incomplete/Unstable Requirements)

2.2 Risk Factors in ISD Projects

The second question that is answered by the literature review is: *What are the possible risk factors in ISD-projects?* In order to identify these risk factors, the base collection of articles is reviewed again. Table 2 provides an overview of the risk factors found in the articles. As shown in the table, Barki et al. (2001) make no distinction between different risk factors; they only use the accumulated risk exposure caused by all risk factors. Other authors do make a distinction and although it seems that many different risk factors are mentioned in the articles, most factors can be categorized into 5 groups (Table 2), we discuss each group below:

(i) Technical Complexity (TC)

Technical complexity refers to the ambiguity and uncertainty in the development of the IS. An IS is complex if new (unknown) technologies are used in it, if it has many links with other systems and lacks a model structure (Lin & Shao, 2000; Rondeau, et al., 2006). Of course, the risk presented to the project by technical complexity depends on the level of experience of the project team members (Blili, et al., 1998; Hardgrave, et al., 1999; Lynch & Gregor, 2004). Technical complexity can refer to fundamental architectural issues, or to the more detailed application issues.

(ii) Organizational Complexity (OC)

The second risk factor is organizational complexity, which can originate from two aspects; the organization itself and the impact of the IS on the organization. The first aspect is mentioned by He and King (2008) and Choe (1998), who refer to the structure of the company (organic vs. mechanic) and the power structure in an organization regarding the IS. In other words: the first aspect is the use of the IS by the employees mandatory or voluntary. The second aspect refers to the potential changes in the organization and the users' working life, brought about by the implemented IS (Lin & Shao, 2000; Wagner & Piccoli, 2007).

(iii) Project Size (PS)

This risk factor is mentioned by Hardgrave et al. (1999) and Wagner and Piccoli (2007), and refers to the size of the project, measured in man-hours. Larger projects can be more difficult to manage; there are more people involved, more tasks to be performed and more things to go wrong.

(iv) Overambitious Demands (OD)

This risk factor refers to the high-level demands of the customer. A customer can simply expect too much of an ISD project, which presents a risk to the project; the risk of not meeting the customers' demands.

(v) Requirement incompleteness/unclearness (RQ)

IS requirements can be divided into 2 basic levels (Davis, 1982; Kirsch & Haney, 2006). The first level contains the organizational or global requirements. These requirements define the overall structure and usage of the IS and can be considered as the strategic requirement of the IS, because they define the management motivation for the implementation of the IS (Davidson, 2002). The second level contains the detailed requirements, defined on the application level (Kirsch & Haney, 2006). These requirements provide a detailed description of how the IS should work (Davidson, 2002).

3. CONCEPTUAL MODEL

In their attempt to develop an integrative contingency model for software project risk management, Barki et al. (2001) identify user participation as one of the three key dimensions of a risk management profile, the other being formal planning and internal integration. They have shown that a better fit between the level of risk exposure of a software project and its management profile will result in a higher project performance.

Although the model of Barki et al. (2001) is clear and intuitively appealing, it has some limitations. The variable 'risk exposure' is shown as a cumulative score that is distilled from all risks present in the project. The score itself only presents the result of these risks in terms of costs and cannot tell anything about the risks that are present in a project (it is possible to calculate the risk exposure score from the risks present in the project, but it is impossible to tell something about the individual risks based on the risk exposure score).

Secondly, the key dimensions of risk management are not studied in depth. The model simply assigns a single score to each of the dimensions (e.g. user participation can be 'high' for a certain project). In the determination of an optimal fit, attention is paid to the intensity of user participation, formal planning and internal integration, but measurement of these intensities is not studied as part of this model.

Third, the fit between risk exposure and the dimensions of risk management are only formulated as: "for a certain level of risk exposure, a certain level of risk management will result in optimal project performance". The model does not provide information about this fit on a more detailed level; that of the individual risk factors and risk management dimensions. Because of this limitation, the model could be too abstract to base decisions on.

Barki et al. (2001) have shown the importance of a fit between project risk management and risk exposure, and by considering user participation to be a key dimension in project risk

management, the relationship between the risk exposure – user participation fit and project performance is also implicitly assumed.

In this research we take the model of Barki et al. (2001) as point of departure and focus on the relationship between the risk exposure – user participation fit and project performance. By doing so, the limitations of the model proposed by Barki et al. (2001) will be studied in detail.

Figure 1 shows the conceptual model we use for this research. In our model we focus on user participation instead of taking the entire risk management construct into consideration. The risk exposure construct is also more concrete in our model; Barki et al. (2001) state that risk exposure equals the probability of occurrence multiplied by the costs of occurrence, accumulated for all risk possible forms of risk. In this research we look at the separate risk factors in detail, in order to find out how user participation can be used to mitigate the risk.

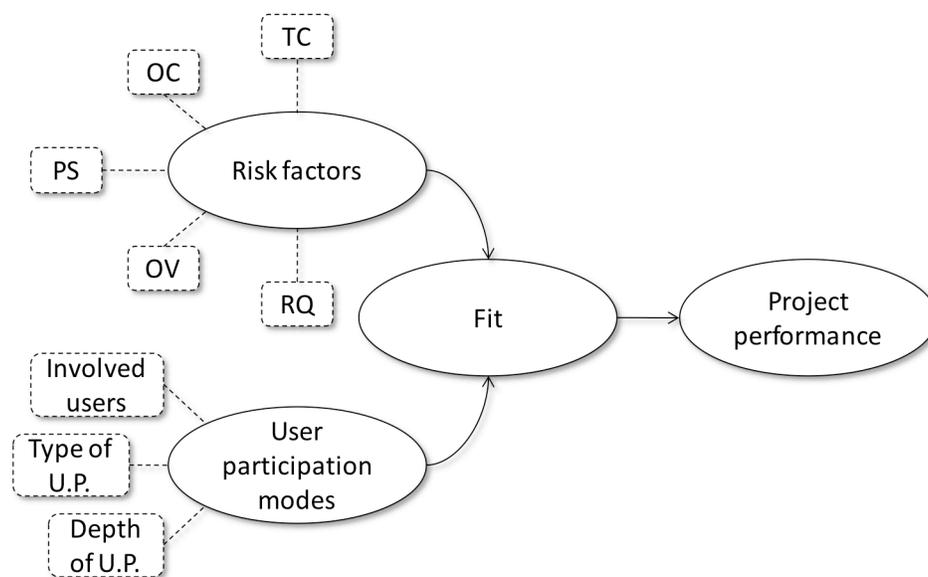


Figure 1: Conceptual model for the application of user participation (Adapted from Barki et al(2001))

The risk factors and the user participation mode constructs are combined into the conceptual model shown in Figure 1. The third construct in the conceptual model – project performance – is one that receives a lot of attention in IS literature. A famous example is the ‘DeLone and McLean Model of Information Systems Success’ (2003). Although it would be very interesting to examine all factors of project performance and their relationship with the application of user participation, this would also complicate the model by adding extra variables and dependencies.

We use the construct of ‘perceived success’ instead of ‘IS success’ for the construct of project performance, and by having only two options for this variable: ‘successful’ and ‘unsuccessful’.

In the next section we will discuss the case study we performed at Capgemini, Netherlands.

4. CASE STUDY

The research was carried out at Capgemini Netherlands in Utrecht. Capgemini is a company that operates worldwide in the markets for consulting, technology and outsourcing. It has over 80.000 employees working in over 30 countries. Capgemini is divided into 4 sectors (Public, Products, Transport, Telecom and Utilities and Financial Services) that operate in 3 disciplines (Technology, Consulting and Outsourcing). Although the case study was held in a technology department in the public sector, departments from all sectors and disciplines were involved in this research.

This research focused on project management, and at Capgemini projects are managed by engagement managers. Capgemini operates 4 certification levels for engagement managers. A level 1 engagement manager is certified for projects up to 15 project members and a budget up to €2.5 million, while a level 4 engagement manager is certified for projects over 100 members and €30 million. For this research, only level 1, 2 and 3 engagement managers participated in the survey and interviews.

Capgemini strives to apply one standard development process to all its (IS) development projects: the Rational Unified Process or RUP for short. Although not all projects use RUP, the phases mentioned above can be used to describe the project state of nearly all large ISD projects. Therefore, these phases will be used throughout this paper to describe the state of a project.

As part of this case study we deployed a survey and interviewed some of the key personnel. A self-administered questionnaire was created using an online survey tool. The questionnaire was intended for level 1 – 3 engagement managers, and because of the relatively small size of the population (approximately 50 engagement managers) no sampling was applied.

The second research method that was used to gain insight in the application of user participation in practice was the interview method. The questionnaire designed in the previous paragraph was used as a guideline throughout the interview, but many open ended, in-depth questions were added. These questions allowed for reflection on previous answers and provided the ability to find out why things happen (Yin, 2003). The interviewees were asked to think of two projects they had managed in the past; the most successful project and the least successful project in terms of planning, budget and delivered functionality.

In total, six engagement managers throughout the organization attended face-to-face interviews. Audio recordings were made of all interview sessions. After the interview sessions, word-for-

word transcriptions were written of each recording. These transcriptions were entered and analysed using QSR NVivo 7. All the names used are pseudonyms for reasons of privacy.

In the next section, we present the results of the survey and interviews.

5. RESULTS

5.1 General Outcomes of the Survey and Interviews

For this research, a survey was sent to 50 engagement managers at Capgemini, 6 of whom were also interviewed. In total, 28 engagement managers returned a completed survey, leading to a response rate of 56%. All participants of the survey were asked about two projects; their most successful and their least successful project. This implies that the survey results hold information about 28 successful and 28 unsuccessful projects. The first test that we performed, was regarding the presence of the five risk factors (see Table 2) in the projects we inspected for this research. Table 3 shows for each risk factor the percentage of projects for which the engagement managers reported the risk to be present (in decreasing order of percentage).

Risk presence in projects	
Organizational complexity	70%
Unstable/incomplete requirement	68%
Technical complexity	64%
Overambitious demands	52%
Project size	21%

Table 3: Risk presence

This research however, focuses on risk mitigation, i.e. reducing the effect of risk on project success. If the results of the survey show a strong, significant and negative relationship between the presence of risk and project success, not taking in account whether the risk was mitigated or not, further examination of the effectiveness of risk mitigation will be difficult. So we examined the relationship between risk presence and project success using SPSS, and the statistical test showed that there was no significance.

The next question that comes in mind is whether user participation was applied to mitigate the risks present in the projects, and, more importantly, whether this had any effect on the performance of the project. The results show that many engagement managers reported to have applied user participation to mitigate the risks present in their projects. Table 4 shows the percentages of projects where user participation was applied in case a risk was present. Although there is a difference in the application of user participation between successful and unsuccessful projects they were not statistically significant.

Mitigated risks with user participation		
Risk	Successful	Unsuccessful
Technical complexity	94%	53%
Organizational complexity	90%	84%
Project size	86%	40%
Overambitious demands	82%	50%
Unstable/incomplete requirements	95%	84%

Table 4: User participation applied when risk present

In the following sections, we present the user participation modes that were applied for each risk.

Technical Complexity

The survey results show that in over 60% of the projects reported by the engagement managers, technical complexity was considered to be a risk for the project. Technical complexity is defined in section 2.2 as the risk that occurs in case of a large number of dependencies and connections with other systems, or when working with new technology. The interview results show that in many cases, these were in fact the sources for technical complexity.

When Chris was asked about technical complexity in his most successful projects, he stated that:

“The problem was not so much the unfamiliarity with the technology we used; this was not rocket science. The thing was: we had to combine 16 existing systems into the new IS. The difficulty was in the amount of systems we had to combine.”

Complexity can also arise from lacking of model structure or from complex model structure. When Floor was managing the development of a new IS for a large bank, she said:

“In order to connect with all the existing systems, we designed a central service bus, which was new to the organization. The architecture had to be designed in a generic way, so that future extensions of the system could easily be implemented.”

As stated in section 2.2, the technical complexity heavily depends on the knowledge available in the project team. Dick was managing the modification of an IS in a large bank. He said about the technical complexity in the project:

“The IS itself was not complex; we knew the system and did not use new technology, we used pretty old technology: COBOL. In fact, that was the problem. COBOL is a well-known programming language, but since it is outdated, finding a programmer for it is a difficult job. This is the problem with legacy: the knowledge is gone.”

These results indicate that technical complexity is a risk that is present in a large number of the investigated projects, and that this risk is often caused by the factors described in section 2.2.

From the interview data we gathered that the complexity arose from the usage of new technology and also from a lack of model structure or from complex model structure.

The survey showed that the engagement managers questioned for this research applied user participation in 72% of the projects in which technical complexity was present. For successful projects, this percentage was 94%, and for unsuccessful projects, this was 53%. Figure 2 shows what people from the client organization were involved when user participation was applied. In the successful projects in which technical complexity was present and user participation was applied, approximately 70% of the engagement managers involved IT management to mitigate the risk. The user participation modes that were expected to be found based on the literature, were found in the projects surveyed for this research. While the end user involvement was much higher than expected, an additional source of technical complexity emerged from the interviews, which was the usage of legacy systems.

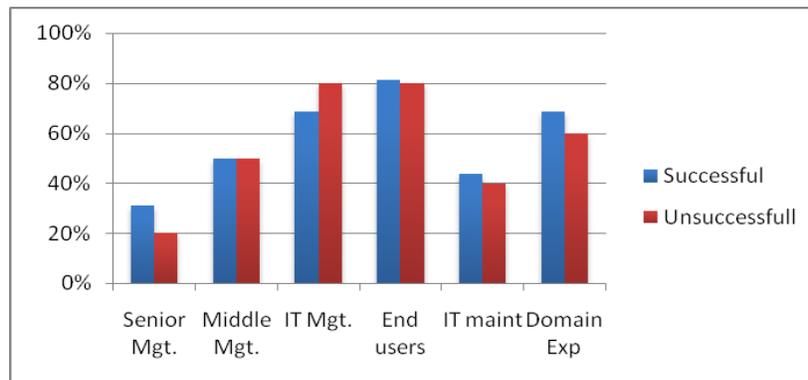


Figure 2: Survey results for user participation modes involving technical complexity

Organizational Complexity

The survey results show that in almost three quarters of all projects reported by the engagement managers, organizational complexity was considered to be a risk for the project. The survey showed that the engagement managers questioned for this research applied user participation in 87% of the projects in which organizational complexity was present. For successful projects, this percentage was 90%, and for unsuccessful projects, this was 84%. Figure 3 shows what people from the client organization were involved when user participation was applied. The results show a high level of participation for management (senior management, middle management as well as IT management) and end users. The interviews revealed that management is involved in nearly all projects in which organizational complexity is considered to be a risk. The degree of participation and the reason they participated differed for the different management levels. In most projects, a high degree of middle management and IT management involvement was measured. Among the main findings were that in successful projects, a slightly higher level of user participation was measured than in unsuccessful projects. Also, the depth of senior management involvement was lower than expected; instead of pro-active participation, senior managers tended to be involved only when there was a conflict with middle management.

Engagement managers tended to focus on the lower management levels. And finally, the level of end user participation depended heavily on the culture in the client organization. As was mentioned by Chris: “*The German culture works with hierarchy. If the manager makes a decision, there will be no discussion, it is simply followed. This does not happen in the Netherlands; everybody wants to be involved.*”

Project Size

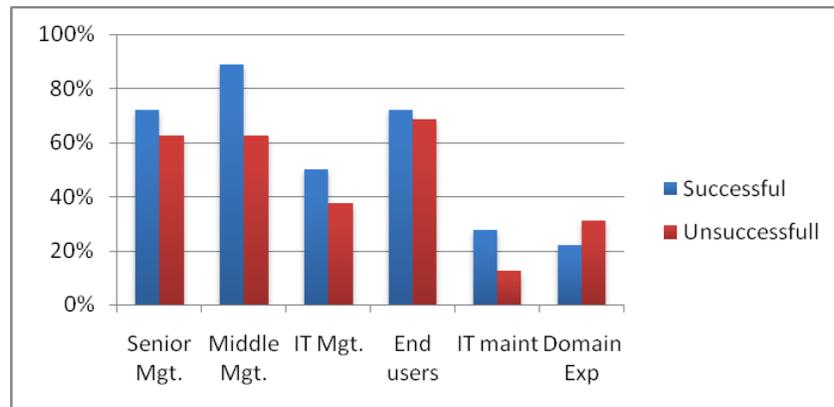


Figure 3: Survey results for organizational complexity

Although project size is considered as a great risk to ISD projects, it was only present in 20% of the projects reported by the engagement managers. The number of engagement managers that actually applied user participation in order to mitigate the risk posed by project size, was even lower than that. Hence, it was not possible to do a quantitative analysis and draw any conclusions from the data.

From the interview results, it became clear that project size was in some cases considered as a risk factor in projects. However, it was not a risk that could be mitigated by applying user participation.

The interview results revealed that engagement managers tended to mitigate this risk by applying project management techniques that can be found in the other two dimensions of the contingency model for software project risk management of Barki et al. (2001); namely, internal integration and formal planning.

Overambitious Demands

The survey results showed that overambitious demands were considered to be a risk in 50% of the projects reported by the engagement managers. Engagement managers questioned for this research applied user participation in 66% of the projects in which overambitious demands were present. For successful projects, this percentage was 82%, and for unsuccessful projects, this was 56%. Figure 4 shows which people from the client organization were involved when user

participation was applied. The survey results show that engagement managers involved management (senior management, middle management and IT management) and key users to mitigate the risk posed by overambitious demands. There was a great difference between the user participation mode applied in successful projects and unsuccessful projects. In successful projects, the focus lay on the participation of senior and middle management, whereas in unsuccessful projects, IT management and key users were involved in mitigating this risk. The interviews show similar results. In most successful projects, senior management and middle management was involved.

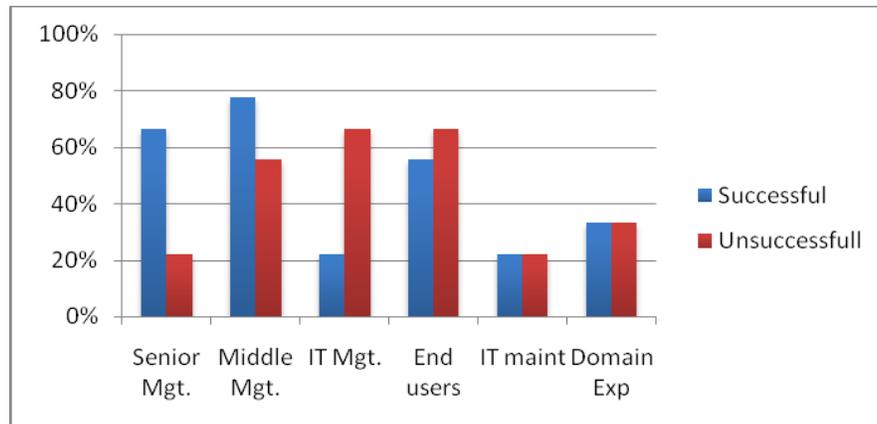


Figure 4: Survey results for overambitious demands

In few of the projects, this was done with actual participation of these persons in the project. In many other projects however, there was little discussion on the topic of overambitious demands. Floor for example, said about her project: *“We informed the senior management that their plan would not work and told them what problems they could expect if they would stick to their plan. They stuck to their plan, and the problems we mentioned did appear.”*

The interviews revealed that there are different demands that can be overambitious, for example, the planning set by the customer can be overambitious or the expected functionality of the IS, and the reason why a customer wants to have a new IS can also be overambitious. For overambitious demands, a clear difference is found between successful and unsuccessful projects. In successful projects, a high level of senior management and middle management participation is shown, which corresponds with the expectations. For unsuccessful projects, very little senior management participation is found. Instead, a high level of end user participation is found.

Overambitious demands refer to high-level issues, which often concern the top management of an organization. Not involving senior management in mitigating the risk of overambitious demands, and not trying to find a solution for this together with the senior management seems impractical. The interviews however reveal that there are several reasons why senior

management was not involved. IT consulting is a competitive market. Winning a contract on a market which is under pressure, means that prices must be low and/or quality must be high. Sometimes, consulting firms agree with demands that they are not sure they can fulfil. Involving the senior management of the client organization in this case probably implies losing the contract.

Although the origin of overambitious demands is in the very beginning of a project, it is often discovered later in the project. When this is the case, it is too late to adjust the project plans, and the project is, at least partially, bound to fail (according to the interviewees' experiences).

Incomplete/Unstable Requirements

Having unstable or incomplete requirements in the project was seen as a risk in two third of the projects reported in the survey. The interviews showed that unstable or incomplete requirements occur due to different reasons. This can for example happen when the requirements are simply not provided by the customer.

According to the survey results, the engagement managers questioned for this research applied user participation in 89% of the projects in which incomplete/unstable requirements were present. For successful projects, this percentage was 95%, for unsuccessful 84%. Figure 5 shows who participated when user participation was applied. The survey results show a high level of user participation for end users and middle management, and a moderate participation for senior management. The interview results show that the focus of user participation for this risk factor lies on the involvement of end users, who are mostly involved through workshops in a consultative way. The workshops are used to distil requirements from the end users. This was the case in the inter-ministerial project Erik managed: *“Every once in a while, we organized conferences in which the project teams and interested managers and end users participated in workshops. From these workshops, the requirements were distilled.”* This is no surprise as end users are closest to the customers and processes, so they provide the most information on these topics. Middle management was often involved and their influence was larger than the influence of the end users. The engagement managers mentioned one other important reason for involving end users in the requirement process, and that was creating goodwill, which will eventually increase user acceptance of the IS.

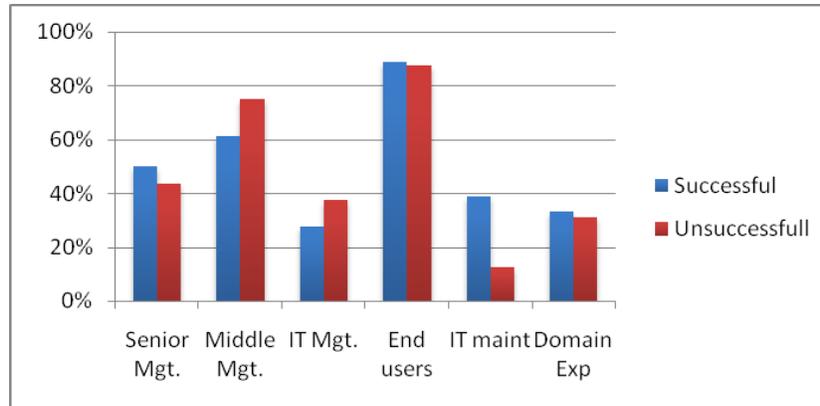


Figure 5: Survey results for unstable/incomplete requirements

6. DISCUSSION AND CONCLUSION

This research set out to fill in the gap that was identified in IS literature on user participation in ISD projects. The literature that was reviewed for this research endorsed the importance of user participation, but failed to describe when and how user participation should be applied. We have addressed this in our research presented in this paper.

For this research, two research goals were defined; the first goal was to gain insight in the relationship between user participation and ISD project risk and the second goal was to construct a practical model that can be used to determine how user participation can be applied to successfully mitigate ISD project risk.

The relationship between user participation and project risk

Our conceptual model used the contingency model for software project risk management by Barki et al. (2001) as a point of departure. The five most prominent risk factors in ISD projects were then identified. For each of these risk factors, a user participation mode was constructed that can be applied to mitigate the risk factor.

The survey and interview results showed that the proposed user participation modes generally corresponded to the way the engagement managers applied user participation to mitigate project risk. This was particularly effective when dealing with Technical Complexity and Overambitious demands. The only exception that was found was for the risk factor 'project size', where most of the surveyed engagement managers did not apply user participation at all. For the other risk factors, roughly the same users were involved in the project phases and for the same roles as in the proposed user participation modes. Although the survey and interview results showed a much broader approach of user participation (i.e. engagement managers also sometimes involved persons in phases and for roles which were different than described in the user participation modes), the set of user participation modes managed to provide a global description of the way

user participation is applied to mitigate the risks assessed for this research. Hence we can consider these user participation modes as a contribution to literature.

The application of user participation in risk mitigation

A second issue that was studied in this research is the relationship between the application of user participation and the project's success. Many authors state that the application of user participation has a large positive effect on the success of the project. This research however showed different results for the surveyed projects. The results show only a slight difference in terms of project success between projects where user participation was applied to mitigate risks, and in those where user participation was not applied to mitigate risks. In the projects where user participation was applied to mitigate risks, almost no differences in applied user participation modes were found between successful and unsuccessful projects. This does not indicate that the proposed relationship between the application of user participation and project success does not exist; this research has only regarded user participation as project risk management technique, and then only focused on the largest risk factors. There are of course numerous other occasions in which user participation can be applied. The results of this research do, however, show that the relationship between user participation and project success is not as straightforward as presented in IS literature.

There are two important notes that need to be made on these results. First of all, there can be more factors that define user participation than the three factors studied in this research (involved persons, type of user participation and depth of user participation). An example of such a factor, which was found in several interviews, is *client intimacy*. Of course, factors like client intimacy are hard to measure, but they can have a large impact on the effect of user participation. User participation can, in reality, be a much broader concept than that defined in this research.

Second, there can be many other aspects that influence project success, besides user participations. This can also be concluded from the model proposed by Barki et al. (2001), where user participation is mentioned as just one of three dimensions of risk management, that can be used to mitigate project risk. User participation alone cannot be held responsible for a project being successful or unsuccessful.

Future work can consider a richer model of IS success along with other determinants, to construct a model of successful user participation.

REFERENCES

- Barki, H., Rivard, S., & Talbot, J. (1993). Toward an assessment of software development risk. *Journal of Management Information Systems*, 10(2), 203 - 225.
- Barki, H., Rivard, S., & Talbot, J. (2001). An integrative contingency model of software project risk management. *Journal of Management Information Systems*, 17(4), 37-69.

- Blili, S., Raymond, L., & Rivard, S. (1998). Impact of task uncertainty, end-user involvement, and competence on the success of end-user computing. *Information and Management*, 33(3), 137-153.
- Brodbeck, F. C. (Writer). (2001). Communication and performance in software development projects [Article], *European Journal of Work & Organizational Psychology*: Psychology Press (UK).
- CHAOS Chronicles*. (2003). West Yarmouth, Massachusetts: The Standish Group International.
- Choe, J. M. (1998). The effects of user participation on the design of accounting information systems. *Information and Management*, 34(3), 185-198.
- Davidson, E. J. (2002). Technology frames and framing: A socio-cognitive investigation of requirements determination. *MIS Quarterly: Management Information Systems*, 26(4), 329-358.
- Davis, G. B. (1982). Strategies for information requirements determination. *IBM Systems Journal*, 21(1), 4 - 30.
- DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems*, 19(4), 9-30.
- Doll, W. J., & Deng, X. (1999). *Should end-users participate as much as they want in the development of collaborative applications?* Paper presented at the Proceedings of the Hawaii International Conference on System Sciences, Maui, HI, USA.
- Gallivan, M. J., & Keil, M. (2003). The user-developer communication process: A critical case study. *Information Systems Journal*, 13(1), 37-68.
- Garrity, J. T. (1963). Top management and computer profits. *Harvard Business Review*, 41(4), 6 - 12.
- Hardgrave, B. C., Wilson, R. L., & Eastman, K. (1999). Toward a Contingency Model for Selecting an Information System Prototyping Strategy. *Journal of Management Information Systems*, 16(2), 113-136.
- He, J., & King, W. R. (2008). The role of user participation in information systems development: Implications from a meta-analysis. *Journal of Management Information Systems*, 25(1), 301-331.
- Heinbokel, T., Sonnentag, S., Frese, M., Stolte, W., & Brodbeck, F. C. (1996). Don't underestimate the problems of user centredness in software development projects - There are many! *Behaviour and Information Technology*, 15(4), 226-236.
- Hsu, J. S. C., Chan, C. L., Liu, J. Y. C., & Chen, H. G. (2008). The impacts of user review on software responsiveness: Moderating requirements uncertainty. *Information and Management*, 45(4), 203-210.
- Hwang, M. I., & Thorn, R. G. (1999). The effect of user engagement on system success: A meta-analytical integration of research findings. *Information and Management*, 35(4), 229-236.
- Ives, B., & Olson, M. H. (1984). User Involvement and MIS Success: A Review of Research. *Management Science*, 30(5), 586-603.
- King, W. R., & Cleland, D. I. (1971). Manager-analyst teamwork in MIS. Cooperation vital in systems design. *Business Horizons*, 14(2), 59-68.
- Kirsch, L. J., & Haney, M. H. (2006). Requirements determination for common systems: turning a global vision into a local reality. *Journal of Strategic Information Systems*, 15(2), 79-104.

- Kruchten, P. (2004). *The Rational Unified Process: An Introduction* (3rd ed.). Boston, MA: Pearson Education, Inc.
- Lin, W. T., & Shao, B. B. M. (2000). The relationship between user participation and system success: A simultaneous contingency approach. *Information and Management*, 37(6), 283-295.
- Lynch, T., & Gregor, S. (2004). User participation in decision support systems development: Influencing system outcomes. *European Journal of Information Systems*, 13(4), 286-301.
- McKeen, J. D., Guimaraes, T., & Wetherbe, J. C. (1994). The Relationship Between User Participation and User Satisfaction: An Investigation of Four Contingency Factors. *MIS Quarterly*, 18(4), 427-451.
- Mumford, E. (1979). Consensus systems design: an evaluation of this approach. In N. Szyperski & E. Grochla (Eds.), *Design an Implementation of Computer Based Information Systems*. Groningen: Sijthoff and Noordhoff.
- Rondeau, P. J., Ragu-Nathan, T. S., & Vonderembse, M. A. (2006). How involvement, IS management effectiveness, and end-user computing impact IS performance in manufacturing firms. *Information and Management*, 43(1), 93-107.
- Steinbart, P. J., & Accola, W. L. (Writer). (1994). The Effects of Explanation Type and User Involvement on Learning from and Satisfaction with Expert Systems [Article], *Journal of Information Systems*: American Accounting Association.
- Wagner, E. L., & Piccoli, G. (2007). Moving beyond user participation to achieve successful IS design. *Communications of the ACM*, 50(12), 51-55.
- Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS Quarterly*, 26(2), xiii-xxiii.
- Yetton, P., Martin, A., Sharma, R., & Johnston, K. (2000). A model of information systems development project performance. *Information Systems Journal*, 10(4), 263-289.
- Yin, R. K. (2003). *Case Study Research - Design and Methods* (3rd ed.). Thousand Oaks, CA: Sage Publications Inc.