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How to be a Successful Project Manager
- Managing Challenges in IT Projects

Bachelor of Science Thesis in Software Engineering and Management

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Abstract

IT projects continues to fail in spite of the vast amount of research on failure avoidance in IT projects. The research has identified several areas of challenge that project managers need to be aware of, and some of these studies have also focused on identifying general strategies for how to manage theses challenges. Despite this research, project continues to fail which suggests a gap between theory and practice. By interviewing project management consultants in a Swedish based IT company we aim to bridge this gap by identifying concrete, practical solutions for how to manage these challenges.

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1 Introduction

Effective project management has shown to play a vital role in the success of IT projects (Boehm 1991, Han & Huang 2007, Tesch et al. 2007, Wallace & Keil 2004). Even though the amount of failing IT projects might be as low as 15% (Glass 2005), there are undoubtedly still many IT projects failing (Cadle & Yeates 2009, Jiang & Klein 2000, Schmidt et al. 2001, Tesch et al. 2007) and looking at the research in the IT field failure avoidance is a dominant theme (Schmidt et al. 2001). In spite of this research projects continue to fail suggesting a gap between theory and practice.

As early as 1991 Boehm showed that project managers that were considered successful, i.e. their projects tended to avoid pitfalls and produce good products, were all good risk managers. The fact that risk management seems to be closely connected to project success has lead to many studies with this focus. The majority of these studies are surveys and literature reviews where focus has been on discovering and ranking risks. However, some of them also provide general advice on how to manage risks (Boehm 1991, Buhl & Meier 2001, Jiang & Klein 2000, Nelson 2007, Ropponen & Lyytinen 2000, Tesch et al. 2007, Yeo 2002). Few studies have been found where the focus is on finding concrete, practical solutions for how project managers should handle these risks or challenges. In this study we aim to bridge the gap between theory and practice by answering the questions:

- *What challenges do project managers frequently encounter?*
- *What strategies are useful in managing these challenges?*

To do this, we have conducted a case study by interviewing project management consultants in a Swedish based IT consulting organization about their experiences.

The remainder of the paper is organized as follows. First we describe the background and previous research within the area of IT and risk management and build a conceptual basis. We continue by presenting the research design and methodology used in this study, as well as ethical issues. After that we present the findings of the study by listing the challenges identified together with avoidance and mitigation strategies for each challenge. Next we discuss our findings in relation to previous research, and finally we conclude the study, discuss limitations and the potential for future work.

2 Related Research and Conceptual Basis

In this section we discuss the concept of IT project management and risk management, the concept of risk and challenge, and previously identified risks and risks strategies in the IT risk management literature.

2.1 IT Project Management and Risk Management

Project management deals with the various aspects of managing projects. It is the application of knowledge, skills, tools and techniques to achieve specific targets within specified budget and time constraints (Kurbel 2008). Risk management, which is a vital part of project management, is a set of principles and practices with the objective to identify, analyze and address risk items to improve the chances of the project to achieve a successful outcome and/or avoid failure (Boehm 1991, Bannerman 2008).

2.2 The Concept of Risk vs. Challenge

The definition of risk as "factors that may lead to an undesirable outcome if no proper countermeasures are taken" ("Risk" 2013) says that even if no countermeasures are taken you can not be sure that the outcome will be an undesirable one. The word 'may' suggests that there could still be an opportunity for a positive outcome. Unfortunately, in the IT industry the word risk has become synonymous to hazard, and our culture has evolved such that owning up to risks is often confused with defeatism. Managing software risks makes good sense, but talking about it can expose you to legal liabilities (Boehm & DeMarco 1997). Even though risks could lead to a negative result, it might also be an opportunity for business development (Smith et al. 2001). We believe this is an important point to make and have therefore chosen to use the word challenge instead of risk. According to the Oxford Dictionaries challenge is defined as "a task or situation that tests someone's abilities" which usually has a positive meaning; you are put in a situation with the possibility to learn something new, become better and evolve. We find the word challenge represents what risk management should be about.

Since the IT risk management literature uses the word risk, to avoid any confusion when we report what previous research has found, in the below paragraph, we will use the word risk. However, in the remaining sections of this paper, the results, the discussion and the conclusion, the risks identified in previous research will be referred to as challenges.

2.3 Risks and Risks Management Strategies

In the IT risk management literature there are two different ways of approaching the topic of project risk. Some studies has solely focused on identifying and ranking risks while others both identify risks and propose strategies for managing them. These risks and risk management strategies have been summarized in Table 1.

2.3.1 Requirements and Scope

Managing requirements and scope is emphasized as being important issues to consider in risk management (Han & Huang 2007, Ropponen & Lyytinen 2000, Wallace & Keil 2004). This is positive since requirements and scope, together with project execution, are the aspects of risk management that project managers perceive to be most easily controlled (Wallace & Keil 2004). Han & Huang (2007) have analyzed the probability and impact of different risks and arrives at the conclusion that requirements have the highest risk exposure. Ropponen and Lyytinen (2000) have looked at project success by analyzing the effectiveness of different management strategies. The study shows that requirements are the component where risk management strategies are most effective. The strategies used was analyzing poorly defined project parts, and improving your overall risk management skills. Other suggestions for how to effectively manage requirements and scope risks is working agile (Boehm 1991, Nelson 2004, Ropponen and Lyytinen 2000, Tesch et al. 2007).

Table 1
Summary of identified risks and management strategies in previous research

Risks	Examples	Author(year)	Managing strategies
Requirements and Scope	New, changing, badly specified, scope creep	Boehm (1991), Ropponen & Lyytinen (2000), Schmidt et al (2001), Cooke-Davies (2002), Yeo (2002), Wallace and Keil (2004), Han & Huang (2007), Nelson (2007), Tesch et al (2007), Bakker et al (2009)	Analyze poorly defined parts by prototyping, scenarios etc. Clear change control process Stakeholder participation
Organization	Environment, commitment, lacking business case, goal, motivation for project, organizational politics	Schmidt et al (2001), Cooke-Davies (2002), Yeo (2002), Wallace and Keil (2004), Tesch et al (2007), Han & Huang (2007), Nelson (2007), Bakker et al (2009), Buhl & Meier (2011)	Align company and project objectives No project until clear business case Create a comprehensive project charter Clearly define project governance and identify the right sponsor Keep project benefits visible and communicate project status frequently Establish and review expectations
Project Management Skills	Schedule estimation, people management, stakeholder management, inadequate risk management, lack of quality assurance	Boehm (1991), Boehm & DeMarco (1997), Ropponen & Lyytinen (2000), Schmidt et al (2001), Cooke-Davies (2002), Yeo (2002), Wallace and Keil (2004), Han & Huang (2007), Nelson (2007), Tesch et al (2007), Buhl & Meier (2011)	Do not mix corporate and individual objectives Keep projects small or decompose and have iterative estimation process by working agile Standardize risk management method and involve everyone in risk management Use a prioritize risk assessment table appoint a risk officer and actively manage the top 10 risks Address personnel issues immediately and co-locate distributed teams for a time Knowledge base of risk management experience and expertise Have joint application design sessions. Use automated testing tools and have daily build tests
User	Involvement, support	Jiang & Klein (2000), Yeo (2002), Wallace and Keil (2004), Nelson (2007), Tesch et al (2007)	User participation in steering team User feedback during the project Customer reviews at milestones to ensure expectations are being met
Technology	New, non-mature, inappropriate	Jiang & Klein (2000), Schmidt et al (2001), Wallace and Keil (2004), Tesch et al (2007)	Should increase corporate value Research/pilot new technology
Resources	Competence, shortfalls	Boehm (1991), Jiang & Klein (2000), Schmidt et al (2001), Wallace and Keil (2004), Nelson (2007)	Review skills and possibly replace Roles and responsibility matrix Consider reduce/change requirements if lack of competence Not commit without enough resources Get external support temporarily or organize cross training
Subcontractors and External Dependencies	Over usage of sub-contractors, system having many external dependencies	Boehm (1991), Ropponen & Lyytinen (2000), Schmidt et al (2001), Yeo (2002), Wallace and Keil (2004)	Perform inspections, compatibility analysis and check references before hiring Team building activities

2.3.2 Organization

Lack of alignment between corporate and project goals and objectives are one of the reasons for failing IT projects (Buhl and Meier 2011, Cooke-Davies 2002). A result of this is unclear and differing expectations and ambitions of the various stakeholders involved in the project. Several other studies also argue that organizational issues such as the organizational environment (Cooke-Davies 2002, Han & Huang 2007, Schmidt et al. 2001, Tesch et al. 2007, Wallace & Keil 2004, Yeo 2002), organizational commitment (de Bakker et al. 2009, Nelson 2007, Schmidt et al. 2001, Tesch et al. 2007), lacking business case and/or project goal (Buhl & Meier 2011, Wallace & Keil 2004, Yeo 2002) and organizational politics (Han & Huang 2007, Schmidt et al. 2001, Tesch et al. 2007, Wallace & Keil 2004, Yeo 2002) are among the key factors for failing IT projects.

Establishing a project management system/project office within the organization is effective for project success (Nelson 2004, Tesch et al. 2007). The project office should create organizational standards, make sure there is a project charter, a sane business case and priority of the project, as well as communicate the strategic value for the project and make sure each project has a project sponsor.

The reason why so many projects continue to fail, in spite of the amount of research into risk management and project success, is due to the failure of organizations to learn from their own experience (Cooke-Davies 2002, Lyytinen & Robey 1999). Explanations to this are organizational intelligence, disincentives for learning, organizational designs and educational barriers (Lyytinen & Robey 1999). According to Lyytinen & Robey (1999) organizations get used to low standards, and over time they accept and learn to live with poor performance.

2.3.3 Project Management Skills

Schmidt et al. (2001) identify project management skills and methodologies as one of the major factors for project success, suggesting that the lack of a structured approach to managing risk might cause problems. A great measure of human judgement is also required in risk management to be able to handle all the complex people-oriented issues (Boehm 1991). Other factors important for successful project management are the technical skill level of the project manager. According to Ropponen and Lyytinen (2000), project managers with a degree in computer science/IT has a higher success rate in managing projects.

The human aspects of the project are more challenging to manage than the technical ones (de Bakker et al. 2009, Drechsler et al. 2010, Kwak and Stoddard 2004, Nelson 2007). Kwak and Stoddard (2004) emphasize that people must be able to evaluate themselves and be motivated to act on their evaluations to change their behaviours in order for projects to become more successful.

It is important to focus on critical success factors for projects and provide techniques to deal with them (Boehm 1991). Risk management becomes more effective dependant on the extent to which it is implemented within the organization (Cooke-Davies 2002, Kwak and Stoddard 2004, Ropponen and Lyytinen 2000). Team risk management is recommended, where the responsibility and burden of risk management is shared. Even if organizations chose to implement risk management strategies, project managers can consciously or unconsciously choose to ignore managing these risks (Boehm & Demarco 1997, Kutsch & Hall 2004).

Reasons mentioned are that project managers want to appear confident (Boehm and DeMarco 2007) or that they deny, avoid, delay or ignore risks (Kutsch and Hall 2004).

Kwak and Stoddard (2004) and Yeo (2002) look at risk management in general. Yeo (2002) suggests a framework for how to perform risk management consisting of three parts focusing on the process, the content and the context of the project. Kwak and Stoddard (2004) evaluate some of the existing risk management processes and highlight how they contribute to successful projects. They conclude that implementing a successful risk management process leads to more successful projects. Along the same lines are recommendations from Ropponen and Lyytinen (2000) that suggest that software organizations should use a risk management process and tailor it to their specific needs, in order to become more successful in managing projects.

2.3.4 User

Failure to manage user expectations is a highly rated risk and several studies emphasize that user involvement is crucial to project success (Nelson 2007, Schmidt et al. 2001, Tesch et al. 2007, Yeo 2002). According to Schmidt et al. (2001), today users must take on more responsibility for the system development and the resulting system, which means that they need to be more closely involved in the development activities. To get user commitment it is important to demonstrate how the system will benefit them (Jiang & Klein 2000), and for continuous commitment and involvement from users try to make them a part of the steering team, hold requirements sessions and design reviews together, and try to make it possible for quick feedback from users during project execution (Tesch et al. 2007).

2.3.5 Technology

Sometimes organizations chase new technology instead of satisfying legitimate requirements which may be a problem (Buhl & Meier 2011, Tesch et al. 2007). These technologies may be new and immature causing unforeseen problems (Buhl & Meier 2011, Schmidt et al. 2001). Organizations tend to overestimate savings from these new tools and technologies but forget that it takes time to learn how to use them to their maximum advantage (Nelson 2007). To avoid spending resources on technology not beneficial to the organization, it is recommended that you conduct a feasibility study to determine the expected benefit, and piloting new technology before deploying it in the entire organization (Tesch et al. 2007).

2.3.6 Resources

Personnel skills and availability is important to consider since it might affect both schedule and quality of the project (Jiang & Klein 2000, Nelson 2007, Tesch et al. 2007). It is important to assign the right people from the start, and take care of the resource competence issues immediately (Nelson 2007). To deal with this, it is important to determine what resource requirements are needed, and assess the skills of those already assigned to the project (Tesch et al. 2007).

Jiang & Klein (2000) explore the relationship between various project risks and system success dimensions. According to their study, lack of general resource expertise and lack of clear role definitions are the two risks identified as being highly significant for project success.

2.3.7 Subcontractors and External Dependencies

Project managers have less insight into and control over the project when there is an extensive use of subcontractors and consultants. This may lead to delivery being late or of a bad quality (Schmidt et al. 2001). When it comes to handling these risks Ropponen and Lyytinen (2000) found that training in project management was not the significant factor in avoiding subcontractor risk, but rather the experience level of the project managers; the more experienced they were, the more successful they were at managing risks concerned with subcontractors and other external dependencies.

3 Research Design and Methodology

In this section we present the research design used in this study and comment on ethical issues and the limitations of our research.

3.1 Research Approach and Setting

We have selected a qualitative approach since the focus of this study is to find out *what challenges do project managers frequently encounter?* and *what strategies are useful in managing these challenges?* A qualitative research approach aims to understand the behaviours of individuals and groups and why they occur. This is done by studying the subject in a natural setting through observation and/or by performing interviews to gather data that will help uncover how the subject perceive, and interpret the social structure it is part of (Creswell 2009). When selecting a qualitative research approach there are several strategies of inquiry which a researcher can apply. The approach chosen here was a case study strategy. A case study looks at a single sample and enables the researcher to study the activity, individual or process in detail (Creswell 2009, Runeson & Höst 2009).

By performing qualitative interviews we were able to get an improved understanding of how the project managers experience the challenges they face, and how they manage them. We have also had experience in performing a qualitative, interview based study in a similar setting, which we found to produce a satisfactory result.

The study has been conducted in collaboration with the IT consultancy organization Sigma AB. Sigma is a Swedish based organization with 1500 employees and offices in nine different countries. The organization works with technologies such as 4th generation mobile networks, smart phones, providing consumer portals for mobile carriers and computer networks in vehicles. Sigma IT & Management comprises of several services and can be grouped into three main areas: system development, business systems, and management services. The project managers that participated in this study all belong to the management services section of the business.

The sample for this study was a convenience sample (Berg 2009). In order to recruit appropriate candidates for the interviews required for this work, the supervisor at Sigma first contacted known colleagues who have a background in project management to ascertain whether they would be willing to partake in this study. Once initial contact was made, she then honed in on certain colleagues who are at varying levels in project management to give the diversity required. The supervisor contacted colleagues who could be divided as per the following; Junior PM, Medium level PM and Senior PM.

Classification:

Junior PM	A project manager whose primary role may be as a Service Manager but has had involvement with projects but has not necessarily had the main responsibility
Medium level PM	A project manager who has had experience of running minor to medium level complexity projects, with budget and staffing responsibilities
Senior level PM	A project manager who has several years' experience of running complex projects

3.2 Data Collection

The data was collected by performing semi-structured interviews that were recorded and later transcribed. The data was treated confidentially and all participants were asked if they felt comfortable being recorded. The interviews were conducted within a period of 2 months and held at the offices of Sigma AB. Ten project management consultants took part, and all of them were interviewed individually with both researchers present on each interview. The interviews lasted between 35 and 60 minutes.

The interview guide contained a description of how the interviews were to be conducted in order to ensure that the same procedure was being followed. The areas covered were background information, project management challenges, managing challenges and leadership strategies. There were eight questions, followed by a set of probing questions. The majority of the questions were broad and open-ended. We also used closed questions to get some basic information about the participant, such as how long they had been working with project management, their background, and other general information relevant for us to put the participants' views in perspective. The interview questions were evaluated after each interview to make sure they supplied us with the information they were intended to do. If not, the question was reformulated and additional probing questions were added.

3.3 Data Analysis

The gathered data were analyzed using thematic analysis (Braun & Clarke 2006). Analysis was conducted in parallel with the interviews. In the initial stage we transcribed the interviews. We then read the interviews several times to familiarize ourselves with the content. During our literature review we had identified several areas of challenge; requirements and scope, organization, project management skills, user, technology, resources, and subcontractors/external dependencies. These areas were the themes we started looking for in our data. We also kept an open mind in case we discovered something that was not covered by any of the themes identified in previous research. Each challenge identified in the interviews was categorized as belonging to one of the themes. Some of the themes covered a wide variety of subjects so these were divided into subcategories. Regarding resources we identified a subcategory that had not been covered in the research we had read, part time resources. There were also two themes identified in previous research, user and technology, which were not covered in any substantial amount in our interviews. From each interview we also identified each project manager's strategies on how to manage these challenges. The practical solutions were divided into avoidance and mitigation strategies.

3.4 Data Validation

To ensure the correctness of the results of the study we have implemented strategies to check for validity and reliability of the findings.

To validate our results we have used a simpler version of member checking (Creswell 2009) meaning that the themes concluded from analyzing the interviews was discussed with our industry supervisor who is also a project manager. This was done in order to make sure that the findings seemed relevant.

To make sure that the procedures of collecting data were consistent throughout the study we documented each step and described it as detailed as possible. We checked our interview transcripts to make sure they did not contain any mistakes. The codes generated from the transcripts were cross-checked among us to ensure the same meaning was interpreted.

3.5 Ethical Issues

During the study we had an obligation to respect the rights, needs, values and desires of the participants. Firstly all participants of the study were kept confidential. Before each interview they were asked if they allowed to be recorded. All the information gathered were kept on our personal computers only and the data and findings were only discussed among us and our university and industry supervisors.

4 Results

In this section we interpret the results of our interviews. It is structured according to the same categories identified in related research. We have summarized the challenges and identified management strategies in Table 2.

4.1 Managing Requirements and Scope Challenges

According to the interviewees, requirement challenges often include: badly specified requirements, changing or new requirements. To avoid these challenges and to ensure that the requirements are clear and up to date the project managers emphasized that it is important to have a clear understanding of what is to be delivered. One of the avoidance strategies suggested is for the project manager to talk with the customer and verify the requirements at the start of the project in order to update or detail them further if needed. It was also pointed out, that it is important to ensure that everyone involved in the requirements specification process have the same view of the goal, and the same interpretation of each requirement. As one project manager told us *"I think that having the same view [of the requirements] is important, that you spend more time on having the same view of what is to be achieved. I don't think that detailing the requirements is the best approach... I think that can be difficult [to do]"*. Helpful methods suggested to achieve this mutual understanding of what is to be delivered are; using proof of concept, mock ups, visual descriptions, scenarios, flowcharts and use cases during the whole project. While some project managers consider that sharing the same view of the requirements is more important than detailing them, others believe that it is better to find a technical expert and spend more time on breaking them down to the smallest part instead.

Challenges	Examples	Managing strategies
Requirements and Scope	badly specified, changing or new requirements	**Avoidance strategies** Verify, update or detail the requirements possibly with the help of a technical expert Use proof of concepts, mock ups, visual descriptions, scenarios, flowcharts, use cases to get the same view of the requirements Get help of the product owner to prioritize the requirements Use experienced colleagues, perform worst/best case scenario analysis to help estimate the non-functional requirements **Mitigation strategies** Make sure there is a change process for changing requirements Discuss with the customer about shrinking the scope or dividing the project into smaller parts
Organization	lack of a clear business case, lack of management commitment, organizational politics, organizational learning	**Avoidance strategies** Have a written down business case before the start of the project Clarify the prioritization of the project and communicate with management to get their attention Get to know the formal organization structure and talk to key people to familiarize with the informal decision making structure Have a clearly documented decision making strategy with different scenarios **Mitigation strategies** Demand action from the customer. To avoid negative atmosphere make clear the requests are for the project's best Be provocative and question the actions of management. Stand firm and have a clear and straight communication Document the changes caused by organizational politics Conduct evaluations and lessons learned with all project members and emphasize the success factors of the project
Project Management Skills	unmotivated people, cultural differences, distributed team, schedule, risk analysis skills, quality assurance, communication, improving project managers skills	**Avoidance strategies** Know yourself and have an understanding of other types of personalities by doing personality tests and team building activities Follow up, keep people updated and put the project in a context with the rest of the organization be careful not to over communicate Have a clear working process and structure documented as a formal agreement and go trough it in detail to avoid misunderstandings Give as much positive as negative feedback Encourage honesty about the progress of the project Meet project members individually and encourage the team members to communicate with each other Have experts and more people involved in the estimation and break down things to smaller parts and work agile Get to know the skills of the project members Organize brainstorming sessions for risk analysis and evaluation continuously throughout the project and document the decisions Assign risk ownership to a person with competence to realize when the risk will manifest and is able to take action if it does **Mitigation strategies** Make sure everyone understands what needs to be done and offer the needed support Co locate team members for a short period of time
Resources	part time resources, resource competence, monetary resources	**Avoidance strategies** Make sure the project members are interested and motivated to work on the project Tell project members to talk to you first before they accept any new or changing responsibilities Arrange training courses or pair inexperienced and experienced team members to work together **Mitigation strategies** Have the manager tell the team members what is prioritized and offer the needed help and support
Subcontractor and External Dependencies	suppliers, consultants or external systems	**Avoidance/Mitigation strategies** Go through the system overview documentation and communicate with people responsible for different parts of the system When using an external supplier, add extra time to the schedule and prioritize it high in the risk analysis

According to the interviewees it is challenging to predict everything from the start, especially in large projects where reality changes along the course of the project. This might lead to requirements having to be updated or changed, and therefore it was recommended that there exist a change process for doing this. It is also helpful to have a product owner that can prioritize the requirements. Since changing the requirements may affect the schedule and budget negatively, a change process enables the project manager to have these changes documented to be able to explain to the customer why the project is late, mitigating the risk of being accused for the project failure. In order to avoid breaking the schedule or budget, it was recommended to discuss with the customer about possibly shrinking the scope of the project, or dividing it into smaller parts. The project managers also suggested working agile is helpful in managing changing requirements.

The project managers perceived non-functional requirements to be even harder to estimate then the functional ones. In these situations, it is even more important to get help from people knowledgeable in the particular domain, or even ask some of the colleagues for advice if they have experience in the area. To avoid incorrect estimations it may be helpful to perform a worst/best-case scenario analysis. Another idea suggested was to create margins by adding time to the schedule.

4.2 Managing Organizational Challenges

Several different organizational changes were identified by the interviewees. These were; lack of a clear business case, lack of commitment, politics and learning.

4.2.1 Lack of a Clear Business Case

It was also pointed out that many times organizations are lacking a project directive, a consensus of what they want that is clear and concise. The project directive should contain a business case, explain what the assignment is, the scope, the effect of the project on the organization, and have a basic schedule, a basic budget and a project goal. According to the project managers these things should be outlined before the project begins to avoid challenges later on in the project.

When it comes to lack of a clear business case, as a mitigation strategy for this the project managers mentioned that it is important to demand action from the customer instead of the trying to solve this on their own. To avoid negative atmosphere the project manager should make it clear that these requests are for the projects best. The customer should take responsibility and can not expect the project manager to solve the lack of a business case. Once a business case has been established it was recommended that it is written down before the start of the project. Not having a clear business case might result in badly or incorrectly specified requirements according to the interviewees, while a clear business case helps the organization keep focus on what is important, and helps the project manager to steer the project in the right direction.

4.2.2 Lack of Commitment

To avoid challenges related to organizational commitment the interviewees emphasized that it is important to have a dialogue with the management was and to clarify the prioritization of the project. According to the interviewees a project manager should not be afraid to be provocative and question the actions of management if they feel that there is lack of feedback.

Asking: "Are we doing this or not?", standing firm and having a clear and straight communication, explaining that it is in the best interest of the project are some of the mitigation strategies the project managers suggested for this kind of situation.

The project managers also experience that organizations sometimes lack good planning at a higher level. This may lead to conflicts with resources between projects and prioritization issues. This is out of the scope of the project manager, but according to the interviewees organizations will benefit from a project office that coordinates projects at a higher level.

4.2.3 Lack of Resources Spent on Risk Management

According to the project managers organizations are not always keen on spending money on activities that analyze risks that might not occur. It was mentioned that it is easier for organizations to say no to a cost early in the project, compared to a cost late in the project, which is one reason why organizations are unwilling to spend time on thorough risk analysis. This is challenging as a project manager to deal with, convincing organizations to spend more money on doing risk analysis. The avoidance strategy suggested is that you tell the customer what might happen if they ignore analyzing the potential risk. The project managers consider it a good mitigation strategy to document the recommendations to the customer in order not to be held as fully responsible later in the project, if the lack of risk analysis becomes an issue.

4.2.4 Politics

Many times organizations may suffer from politics such as old quarrels between departments and hidden agendas. This can make it difficult to understand why particular decisions are made. According to the project managers there are two types of politics; hidden and open. When the politics is hidden it might be difficult to notice it at the beginning. Avoidance strategies suggested is that you are vigilant and communicate with people constantly. The project manager should also familiarize himself/herself with the organizational structure by requesting that information from management.

However, as pointed out by the project managers the formal organizational structure might not always match the informal decision-making structure. To avoid potential challenges the project managers emphasized that it is important to interview or talk to a few key people in the organization to familiarize oneself with the informal structure. In this kind of situation it becomes even more important to have clear decision making strategy documentation with different scenarios ready when the project is started.

If politics affect the project and the project manager becomes directly affected by these kinds of issues it is important to mitigate the challenges by discussing this openly with the steering group. If the steering group does not pay enough attention to these issues and help to solve them, it was even recommended that the project manager leave the project.

In case the politics are open and it is a question of the prioritization of the project, then it is easier to manage according to the project managers. If the project resources are cut then it is an organizational decision that the project manager can not affect. To mitigate the risk of being held responsible if the project fails the interviewees pointed out that it is important to document these changes.

4.2.5 Learning

At the end of a project, evaluating project performance and doing lessons learned sessions was said to be important in order for both project managers and organizations to improve their project management practices. Apparently it is not always easy to spend time on evaluations because organizations have a tendency to want to continue to the next project instead of reflecting on what has already been done. It is suggested that all project members participate in the evaluation to get as complete a picture as possible of the project. Many of the interviewees also noted that it is important to not only focus on what can be done better but also to point out what was done well, the success factors of the project.

4.3 Challenges Related to Project Management Skills

During the interviews the project managers pointed out that in their work managing people is more challenging than managing the schedule or the budget of the project.

4.3.1 Unmotivated People

Motivating people to deliver and getting people to cooperate and communicate was identified as one of the most challenging parts of project management. Different project managers have different approaches to managing these challenges. Knowing yourself and having an understanding of other types of personalities is considered helpful in order to manage and communicate with people. It was suggested as good practice to create some level of personal relationship with people by being interested in the small things. As one of the project managers said *"I try to see them [the team members], encourage them and give them a pat on the shoulder for the small things and not only when something big has been delivered. So that they feel that someone notices them and they feel needed and seen"*. According to the project managers this is a way of making people feel valued and enjoy the workplace, which in turn is said to lead to motivated employees. In general, the need for positive feedback was pointed out by the project managers as a good way of avoiding challenges with unmotivated people. Another avoidance strategy suggested was team building activities as a way of motivating the team and strengthening the cooperation between the team members.

During the project it is recommended that everyone feel that they are responsible for their own little thing and that everyone knows their role within the project and why it is important. Communicating with the team members about the reason for the project, keeping them updated on the progress and putting the project in a context with the rest of the organization was considered being good avoidance strategies. Another recommended strategy is to make sure that every project member knows they have a voice in the project and that they are allowed to share their opinion and feel that someone is listening to them.

It was also reported that sometimes people are not being honest about their work - they say that they are going to do it but in reality they never do. Mitigation strategies suggested for this was to sit down and go through all the activities with the people involved making sure they understand what should and needs to be done. It was also pointed out that it is important to do regular follow ups to make sure the team is on track and offer them support or help if they need it. If people are being really problematic the best solution suggested was to have them swapped out.

4.3.2 Cultural Differences

The experience of the interviewees is that outsourcing often leads to challenges due to different ways of working. Organizations in some countries have a policy of rotating their staff often so there is a constant need to train new people. Unfortunately influencing this is out of the hands of the project manager, but it is an important factor to be aware of. Avoidance strategies for how to deal with cultural differences is to have a clear working process, with a clear structure, and have a documented formal agreement. Also, going through everything in detail, point by point, to make sure there are no misunderstandings might be helpful. Meetings, decisions and responsibilities should to be thoroughly documented and reviewed by everyone involved. To get a feeling for what types of people are in the project, it is suggested that everyone takes a personality test in order to avoid potential personality challenges. As a mitigation strategy it was suggested to co-locate people for a short period of time in order to "put a face on the person at the other end of the line" and to create team spirit by performing team building activities.

Another big challenge is how deadlines are perceived in different cultures. The lack of "heads up" when something is not working or about to be late can be very challenging. As one of the project managers said: *"If something is due to be delivered by Friday, for them it is not late until it is Friday"*. To avoid and mitigate this challenge it was suggested that one should encourage people to tell it as it is and being honest about the progress of the project.

4.3.3 Distributed Teams

When working with distributed teams using the same avoidance strategy as mentioned above, of doing personality tests, was recommended. Other avoidance strategies suggested is to make sure that people are interested and motivated to work on the project. Another suggestion was that due to the time zone difference, it might help to meet one project member at a time instead of having team meetings. The project managers also recommended that the team should be encouraged to communicate with each other, instead of via the project manager.

4.3.4 Schedule

Doing time estimation can be a challenging task and projects are late more often than not according to the project managers. One avoidance strategy suggested was to use project members with enough knowledge and experience to help the project manager create more accurate time estimations. In general, having more project members involved in the time estimation phase, creates better time estimations according to the project managers. Another avoidance strategy suggested is to break down tasks in smaller parts, because things that are broken down are easier to estimate. This might be difficult to do at the beginning of a project, since the project manager might not know enough about the different parts. Something else that the project managers mentioned was that when planning the projects, better estimations are usually created when you are familiar with the people working on the project, when you know their competence and capacity.

Other challenges mentioned are that things often take more time than the actual working hours. The suggestion for how to handle this was adding more calendar time to the schedule to account for people being sick, going to meetings, reading emails etc.

Aspects to consider in large/long projects are that the world outside the project tends to change, forcing alterations of the plans, which may cause delays. A mitigations strategy for avoiding delay is to try and divide the project into smaller parts, or possibly shrink the scope.

It was also pointed out that changes to the schedule are not automatically a bad thing if the reason for these changes is in line with the business case and the goal of the project. The project manager should make sure that all changes, and the reason for them, are documented in order to be able to show the customer why the schedule has changed/project is late.

The general advice from the project managers to avoid changes in the project that challenge the schedule was working agile.

4.3.5 Risk Analysis Skills

Risk analysis is found to be a central task for the project manager to do. Things mentioned important to consider is that risks are not static, some risks manifest and others do not, and therefore risk analysis is not something that should be done once at the beginning but instead continuously throughout the project lifecycle. The project managers recommended that you do short sessions with risk evaluations throughout the duration of the project, and assign someone from the organization as responsible for handling that. Another avoidance strategy suggested is to organize brainstorming activities as part of the risk estimation process. In these sessions people think a few steps further, someone that has been in a similar situation can suggest a strategy for how to handle it. It is also mentioned that it is important to document if an identified risk is too costly to handle at the time and is put aside.

Throughout the project ownership should be assigned for each risk to avoid the responsibility for it landing only on the shoulders of the project manager. According to the interviewees, it is necessary that ownership is given to a person with enough competence to realize when the risk is about to manifest itself, and with a position within the organization enabling them to take action if it does.

4.3.6 Quality Assurance

Lack of testing may jeopardize the quality of the project. One challenge project manager's face is convincing the organization to spend enough time on testing before moving on in the project. One reason mentioned as to why not enough testing was done was lack of resources. The avoidance strategy suggested is to emphasize how the lack of testing will affect the outcome of the project.

One challenge the project manager might face is a lack of testing environments. Having testers not being able to do their job due to the environments being unavailable is an expensive cost to pay. This is difficult for the project manager to affect and according to the interviewees organizations should evaluate how this influences their overall cost, performance and quality of what they produce.

4.3.7 Communication

Communication challenges identified were of two different types: communication in the project as a whole and communication within the team.

If it is a large project it may be challenging just to reach everyone who is involved with the correct information. One avoidance strategy suggested for this is to set up an administrative network at the beginning of the project so that everyone knows where to find information about the project. However, the project managers also raised a warning not to over-communicate things because it tends to lead to people not reading their emails anymore and not answering their phone because they feel overwhelmed by the constant information flow. As one of the project managers said *"I have noticed recently that people communicate a lot so there is an overflow of information. Recently I've been getting "I don't read emails" automated replies and then you try to call them, but they don't answer the phone because they feel overloaded"*.

To handle communication within the team it was recommended to be visible to the team by doing a daily round acknowledging everyone's presence and doing a general status update.

Working agile and using scrum was also recognized as a powerful avoidance strategy beneficial for strengthening the communication both within the team and in the project as a whole.

4.3.8 Improving Project Manager Skills

In order to improve their skills, the project managers said that it is important to get constant feedback. Some feel that they can get better feedback from people they know personally, while others believe that kind of feedback might be biased. It was suggested that you ask someone else to do the project evaluation for you, or to get project managers or colleagues from outside the project to do the evaluation. The project managers also believe that it is good to have a mentor to consult with.

4.4 Resources

According to the project managers resource challenges are frequent. These challenges relate to lack of monetary resources, resources not working full time on one project or the competence and skill level of the project members.

4.4.1 Monetary Resources

The general experience of the project managers, when it comes to organizational challenges, is that organizations today are unwilling to spend enough resources at the beginning of the project for a pre-study. Inadequate planning in the beginning of the project may result in increased costs later, and despite of this organizations tend to try and save resources at this point. Spending time on risk analysis and thoroughly analyzing the requirements is expensive, and motivation for doing this is low according to the interviewees. A reason for this was suggested to be that it is easier to say no to a planned cost in the beginning, than a critical cost later on.

4.4.2 Part Time Resources

Part time resources may not prioritize the project due to lack of loyalty towards the project or unclear priorities in the organization. Avoidance strategies suggested is talking with the assigned people to see if they are interested and motivated to work on the project, offering them any help they might need to prioritize the project. Another recommendation was to make sure that the team members know they should talk to you before accepting any new or

changing responsibilities on other projects. Mitigation strategies suggested is to have the manager/project sponsor tell the project members what is prioritized or try to have them swapped out.

The project managers felt that it is challenging when their role is either part time, or when they have several projects running in parallel. It makes it difficult to prioritize their tasks, and they usually need to spend more time on each project then what was officially specified.

4.4.3 Resource Competence

Unless the project manager has the same resources throughout different projects they face the challenge of not knowing their competence or performance level, neither technical nor social. This is also a problem when outsourcing or using external resources. According to the interviewees, resource competence need to be specified clearly in the beginning of the project to avoid deliverables being late, or the quality of the deliverable is poor. Avoidance strategies suggested was to first talk with the individuals themselves to clarify their competence, and then notify the steering group and ask for more or other resources if needed. Another suggestion is to swap resources or plan for training but this might influence the schedule. The training can also be done in a "team thinking" manner where someone inexperienced works together with a more experienced person.

4.5 Subcontractors and External Dependencies

External dependencies are other parts of the system that the project is dependant on and the project manager is not in control of, such as outside suppliers or consultants. One avoidance strategy suggested by the interviewees is to prioritize these risks high in the risk analysis, since they often only allow for a limited amount of insight.

System dependencies make it complicated to see all the possible risks and are sometimes discovered only when the project is broken down to task level. In this case the project manager needs to get more insight into the project/system parts by communicating with people responsible for the respective part. Avoidance and mitigation strategies suggested is having scrum of scrums, going through the system's documentation, and investigate the dependencies with the help of an architect.

When the project is dependent on outside suppliers or consultants, there is a risk that the supplier might not deliver on time or not deliver at all. When using external suppliers, a useful avoidance strategy suggested is to add extra time to the schedule and motivate to the customer why this is needed.

5 Discussion

In the following section we will interpret and discuss our findings in relation to our research question *what challenges do project managers frequently encounter?* and *what strategies are useful in managing these challenges?* We will also discuss similarities and discrepancies between our findings and previous research.

5.1 Requirements and Scope

Our study shows that it is difficult to understand, detail and prioritize the requirements at the start of the project, especially in longer projects where reality changes during the course of the project. Changing requirements may pose a threat to the project and influence both the schedule and the budget negatively. It is indicated that working agile and dividing the project into smaller parts is beneficial, since in this process all the requirements do not need to be detailed from the beginning. Agile also allows for changing the prioritization of the requirements without affecting the planning. This is also in line with what previous research has found (Boehm 1991, Nelson 2004, Ropponen and Lyytinen 2000, Tesch et al. 2007).

Our study also indicates that breaking down requirements in smaller tasks make it easier to do correct estimations. This is in line with previous research where requirements have been identified as the component in project management where risk management strategies are most effective in keeping the schedule and budget (Ropponen and Lyytinen 2000). The risk management strategies suggested was to analyze poorly defined parts of the project. This would also suggests that if there is one challenge that project managers should prioritize in order to achieve project success, it is managing the requirements.

5.2 Organization

The literature points out that organization play a vital role for enabling project success (Buhl & Meier 2011, Kwak & Stoddard 2004, Nelson 2007, Tesch et al. 2007, Yeo 2002). Our study also recognizes organizational issues as challenging in project management. One of these challenges is lack of a business case. The lack of a business case suggests an uncommitted management which is a big challenge for a project manager. In several studies uncommitted management has been identified as being one of the top challenges to manage in order to achieve project success (De Bakker et al. 2009, Nelson 2007, Schmidt et al. 2001, Tesch et al. 2007). This is something that the project manager can not control directly, it is mostly up to the organization, and the only strategy our study has identified is to draw attention to this issue. The project managers should be persistent in their behaviour, and question the lack of commitment. They should explain how this affects the project and explain that inattention from management brings other challenges, and compromises the outcome of the project.

Lyytinen & Robey (1999) argue that organizations get used to low standards and over time come to accept and learn to live with poor performance. This is interesting since many of the project managers report that projects are more often late than not. If being late becomes the norm, which seems to be the case judging by the result of our study, does that affect how project managers value the importance of being on time? When project managers start planning for a project and realize that there are many dependencies and many critical tasks to be done, and that these might cause a problem or they might not, should they then really spend a lot of time on planning for a disaster that might never happen? If almost all other projects so far have been late, and that has been OK, it will probably not be the end of the world if this project is also late? There is still a possibility that the disaster never happens, and that the project will be on time. But if more time is spent in the beginning for analysis, the project will definitely take longer, resulting in higher costs. So the question remains, if project managers and organizations have settled for the results we see today, will more research into project success, identifying challenges and strategies for how to manage them, really make a difference? This seems to be underlying dilemma.

The interviewees also reported that organizations could spend more time on analyzing risks. One reason mentioned for why organizations, to some extent, want to avoid spending time on risk analysis, was that it is always easier to say no to a planned cost in the beginning than an acute cost late in the project. Spending resources on analyzing risks that might not even materialize is difficult for project managers to argue for. This is problematic since previous research show that in order to manage more successful projects, organizations should tailor their risk management process to their development environment (Ropponen and Lyytinen 2000), which means spending resources on activities not generating money instantly. Literature does not give any concrete solution for how project managers should handle this, to some extent it is out of their hands. This study reveals that it is important to explain to organizations the repercussions of not doing enough risk analysis. Organizations themselves need to realize that it is important to spend time on analyzing risks and perform risk management, in order to be able to run more successful projects. One of the most effective strategies according to Nelson (2004) and Tesch et al (2007) is related to establishing a project management system/project office within the organization. The project system/office should be responsible for creating organizational standards, making sure there is a project charter, a sane business case and priority of the project, as well as communicate the strategic value for project and make sure each project has a project sponsor.

Regarding project evaluation, many of the interviewees portrayed an image that organizations just want to move on to the next project, and not dwell on something that is already finished. If this is true, than it is problematic since according to our study, it is important to be able to do project evaluations and lessons learned sessions, in order for people and organizations to become better in managing projects. This is also supported by Cooke-Davies (2002) and Lyytinen and Robey (1999) who point out that an important factor for organizations to increase the amount of successful projects is learning from experience.

5.3 Project Management Skills

Previous research emphasize that human aspects are more challenging to manage than technical aspects (De Bakker et al. 2009, Drechsler et al. 2010, Kwak and Stoddard 2004, Nelson 2007). This was also found in our study that most often more time is spent on managing people than managing the technical aspects of the project. Dealing with people is a complex and challenging task, and as revealed in this study there are several aspects to consider: cultural differences, distributed teams and unmotivated people. Aspects of managing people such as cultural differences and distributed teams are very challenging and should not be underestimated. The interviewees that had experience working with distributed teams, felt that it is necessary to co-locate for a short period of time to be able to create some kind of relationship with between project members which is also suggested by Nelson (2007). Team building activities were also seen as a helpful tool to manage people, and especially get to know their competence and skills. This appears to be considered an important challenge in IT project management since there are many studies looking only at the challenges of distributed teams and cultural differences.

Cooke-Davies (2002) and Kwak and Stoddard (2004) emphasize that in order for project managers to become more successful, they need to evaluate not only the project performance but also their own performance. They also need to be motivated to act on their evaluations in order to change their behaviours (Kwak & Stoddard 2004). This is also something that was considered very important by the interviewees. They felt that in order to improve their skills they need to get constant feedback, not just at the end of the project, but also continuously

throughout it. It is also important to consider from whom the project manager requests the feedback. It is good practice to have all the team members take part in the evaluation, but also consider to have someone outside of the project evaluating the performance. According to Ropponen and Lyytinen (2000) project managers with a degree in computer science/IT in general managed more successful projects. This suggests that project managers looking to improve their management skills may consider learning more about the technical aspects of the trade.

5.4 Resources

Our study shows that having the right resources in the project is crucial for project success. Not only does it affect the schedule, it also affects the quality of the project. Having part time resources and lack of resource competence are two challenges that project managers face in this area. According to the interviewees, better schedule estimations are done when the project manager knows the competence of the resources, which is line with what previous research has found (Jiang & Klein 2000, Nelson 2007, Tesch et al. 2007). There are two levels of competence that the project managers we interviewed discussed; technical skills and soft skills. It is more difficult to assess the soft skills of the resources than their technical competences. This is why team building, as well as other social activities, is very important to consider.

While previous research emphasizes that lack of resources as one of the more common challenges in resource management, this was not mentioned by our interviewees. Instead, part time resources were mentioned as a big challenge and something that usually affects the project negatively. Project managers constantly have to battle with resources that do not prioritize the project, jeopardizing on time delivery. According to our study, where possible, the project manager should requests resources working at least 50% on the project.

Besides having part time resources project managers are sometimes scattered, working on different projects simultaneously. Affecting this is usually out of the hands of the project manager, but organizations should keep in mind that in order to increase successful project management, they should try and have project managers working full time in that role and make sure that each project manager only manages one project at a time.

5.5 Subcontractors and External Dependencies

Both Schmidt et al. 2001 and our study indicate that when using subcontractors and outside consultants, there is often a limited amount of insight into their activities. This make it challenging to have control over the schedule and it might lead to delays in delivery, or not having anything delivered at all. The literature covered in our study suggests strategies such as performing inspections, checking references before hiring and doing compatibility analysis. These strategies all suggest that the project manager has the ability to affect the selection of subcontractor or consultant. In our study the project managers are not in a position to influence the choice of subcontractors. This is why the strategies here focus on how to manage an already existing subcontractor or consultant, and includes recommendations such as communication, adding time to the schedule to allow for delays and prioritizing the subcontractor issue high in the risk analysis.

6 Conclusions

In spite of the large amount of research into IT project management success, projects still continue to fail. As emphasized in the IT project management and risk literature, there are many challenging aspects of a project that project managers need to be aware of. In this study we set out to investigate these challenges and to present strategies on how to manage them in order to help project managers become more successful in managing projects. The study show that project managers are very often faced with organizational issues difficult to manage, such as organizations being used to low standards, lack of resources spent on risk analysis in the beginning of the project, lack of evaluation of the project and part time resources.

Organizations and project managers getting used to low standards, such as projects being late or more costly, might be problematic. Can this lead to both of them taking on a passive approach towards the projects and accepting this outcome as an inevitable part of reality? This seems to be an underlying dilemma for project managers and organizations. Already at the start of the project, project managers might face challenges when it comes to performing risk evaluation of the project. Organizations consider evaluating the risks associated with the project as an unnecessary waste of time and resources. This study emphasize that it is important to communicate and explain to organizations the repercussions of not doing enough risk analysis. Not only that there is usually lack of resources spend at the start of the project, very often organizations are equally quick to initiate a new project before they have performed lessons learned, and reflected on the previous project in order to improve or establish good practices. According to previous research and our study this evaluation is necessary for organizations to be able to manage more successful projects. Part time resources are another challenge project managers face very often. In contrast to previous research, our study showed part time resources are very problematic to handle and might have a negative impact on the project. Working with part time resources means that the project managers constantly have to battle for getting project attention, and that is why it is very important to request resources working at least 50% on the project.

6.1 Limitations of the Study

The results of this study needs to be viewed in the light of this being a single case study. A multiple case study with different organizations, in different contexts, would have provided us with richer results. We have also only interviewed between half and a third of the project managers at Sigma AB, meaning that we can not be sure that our interviewees are a good representation of the entire sample. However, the scope of this study only allowed for a single case study with a limited amount of participants.

Another limitation is that the interview questions were not sent in advance to the project managers, which would have been a good opportunity to enable them to discuss this with colleagues, and give them time to think about the topic. This however, would have posed issues like the project managers being influenced by others opinions.

The study could have been performed using a focus group with project managers instead of individual interviews. This might have provided a richer result with more suggestions on how to avoid and mitigate identified challenges. On the other hand this might have led to some people dominating the group, and not giving everyone a chance to express their views. It was also really difficult to schedule all the project managers for the same appointment.

6.2 Future Work

With this study we have aimed to bridge the gap between theory and practice of IT project management. We believe we have identified some strategies that project managers can apply to their daily work in order to manage the challenges they face, thus increasing the number of successful IT projects. However, there is definitely a need for further research in this area. We encourage other researchers to conduct a similar study, identifying practical strategies for managing challenges, but with a more diverse and larger sample. This would allow for more straight forward strategies for managing challenges to be identified, which will hopefully help bridging the gap between theory and practice and enable organizations to run more successful projects.

Another relevant aspect to look into is the success rate of different mitigation strategies. It is important to evaluate strategies to find out to which degree they contribute to project success. This has been done to some extent in previous research (Ropponen & Lyytinen 2000), but since new strategies for managing challenges continue to be identified, it is important that we also continue to evaluate their effect.

We also recommend researchers to look more deeply into the issues of organizations getting used to low standards and how that affects project success. As previously mentioned in this study, due to the fact that project managers and organizations very often accept project failure as an unavoidable part of reality, it might be difficult to promote the introduction of new management strategies. The research community could continue identifying challenges, and strategies for how to manage them, but as long as they are not implemented in practice, this effort has been in vain. Therefore it is important to do further research on how to turn the attention of project managers and organizations to the need of improving their practices regarding project management.

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