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Increased Project Management Success

A study of Critical Success Factors in IT projects at a logistics company

Master of Science Thesis in the Management and Economics of Innovation Programme

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Abstract

Despite scholars substantial attention to project management and project success in the recent decades, projects in many organizations still continue to disappoint stakeholders. Making the distinction between project success and project management success, we take on a hybrid approach, discussing both the definition of project management success and critical factors to achieve it.

By collaborating with the IT department at Schenker AB in Gothenburg to develop a project performance measurement system we explore the definition and criteria for project management success. Establishing the definition to be project delivery on schedule and on budget we turn our focus to factors facilitating fulfillment of those criteria. We develop a conceptual model of theoretically grounded project management variables and explore their explanatory power for the two project management success criteria: schedule and budget.

Through structured interviews with project managers we collect data on 29 IT-project conducted at Schenker. Using statistical analysis we identify three factors with significant impact on project management success. For project schedule performance we conclude support from senior management and risk management to be critical success factors. For project budget performance we conclude support for senior management, risk management as well as monitor & control to be critical success factors.

Keywords: project management, project management success, critical success factor, performance measurement, project evaluation, project performance, regression analysis, management support, risk management, monitor & control.

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Glossary

Critical success factor (CSF) - A factor that can be linked to success, in this case project management success.

Iron-triangle - Projects need to be performed and delivered under certain constraints. Traditionally, these constraints have been listed as scope, time, and cos. Forming the iron-triangle.

Key Performance Indicator (KPI) - A KPI evaluates the success of a key activity that an organization carries out.

Project success criteria - The measures used to judge the success or failure of the project.

Project Management Office (PMO) - PMO is a department within a company that defines and maintains standards for project management within the organization.

Work Breakdown Structure (WBS) - WBS is a deliverable-oriented breakdown of a project into smaller components. A work breakdown structure is a key project deliverable that organizes work into manageable sections.

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Introduction

1.1 Background

The use of projects as a vehicle to achieve business objectives has steadily increased over the past decades (Todorović et al., 2015). Despite scholars endless attention to project management and project success, performance of projects in many organizations still continue to disappoint stakeholders (Cooke-Davies, 2002). Regardless of whether the business is project-based or operation-based, project performance translates directly into bottom line results and thereby has a direct impact on corporate success. It is therefore in the corporate interest of many organizations to identify factors that facilitates and reinforce project success.

Project success is a topic that has been investigated intensively in the project management research literature throughout the years (McLeod et al., 2012; Lavagnon, 2009; Pinto and Slevin, 1988). As researchers' understanding of project success has developed and grown, there is an increasing consensus of the complexity and ambiguity that surrounds project success (McLeod et al., 2012). This involves both the definition as well as the measurement of success.

There is no consistent interpretation of the term "project success" (Baccarini, 1999). However, it is important to make the distinction between project success and project management success (Wit, 1988). Project success is the fulfillment of stakeholder expectations by the final product and project management success is the project process' accomplishment of cost, time and quality objectives. The focus of this paper will lie on project management success.

The fact that project management success is multidimensional introduces the question whether different input factors relates more or less strongly to different project outcomes (Scott-Young and Samson, 2008). The most common method is to sum up the different dimensions of success into a single measure of project management success. This method fails to identify the possibility that different success factor effect different outcomes. Following Scott-Young and Samson (2008) we chose to divide project management success by testing our conceptual model for two separate measures of project management success: cost and time.

Lavagnon (2009) writes that research on project success generally falls into two categories:

1. they deal with project success criteria, or
2. they examine critical success factors (CSFs)

In some cases a hybrid category, where both success criteria and CSF are examined. The distinction between the two concepts of success criteria and CSF is that the former refers to a group of principles or standards that are used to judge project success and the later refers to the conditions, events, and circumstances that contribute to project results (Lavagnon, 2009; Müller and Turner, 2007). This paper will use the definitions provided by Müller and Jugdev (2012):

- Project success criteria: "The measures used to judge on the success or failure of the project; these are the dependent variables that measure success."
- Project success factor: "the element of a project which, when influenced, increase the likelihood of success; these are the independent variables that make success more likely."

Lavagnon (2009) also found that very few articles discuss both success factors and success criteria, and few empirical studies have sought to examine important links between CSFs and success criteria. In this study we do just that, we take the hybrid approach, discuss both concepts, and examine important links between CSFs and success critera. As noted in Fortune and White (2006) and Lavagnon (2009) there exists limited agreement among authors which CSFs can be linked to project or project management success. Thus more research on this subject is warranted.

Much of the literature trying to identify factors affecting project success is done on projects in construction, or other similar contexts. Moreover, much of the research has been performed through large scale quantitative studies (Lavagnon, 2009). Researchers have called for more empirical research in project management with emphasis on information system (IS) projects (Barclay and Osei-Bryson, 2010; Winter et al., 2006). Schenker is a multinational logistics company, where IT acts a support function to the overall business delivery. Research on project management in this type of setting is even more sparse. Scott-Young and Samson (2008) also highlights the difficulty of effectively measuring project performance since each organization has its own way of measuring and expressing performance and success. This hampers large sample research as it is not possible to objectively measure project outcomes that compare across project, companies, sectors, and industries. To handle this problem this paper will use a case study approach at Schenker AB's IT department to study the projects undertaken at the department. The unit of analysis will be specific projects, instead of companies (which is more common in previous research).

In summary, we investigate Schenker's definition and use of project management success, then develop a conceptual model of theoretically grounded project management variables and explored their explanatory power for two project management

success criteria at Schenker AB's IT department.

1.2 Purpose and research questions

The aim of this research is two-fold. First, we aim to increase the understanding of what constitutes project management success: how it can be defined, measured and monitored at Schenker AB. Second, we investigate what factors effects project management success at Schenker AB.

Previous research on the subject has been focused on projects which produce the core product of the conducting company (mainly construction projects in construction companies and software development projects in software companies). This thesis adds to existing research by exploring the critical success factors for projects at a non-core, supporting division.

The results of this study aim to provide an example of definition and measurement of project management success. Furthermore, to give organizations insight into what factors that affects project management success in this context.

As Clarke (1999) writes, when the existence of critical success factors have been established, the next step is to consider how they might help companies improve their project management efforts. By targeting issues through critical success factors higher effectiveness of project management can be achieved. This leads us to the following research questions (RQ):

RQ1 How is project management success defined and used at Schenker?

RQ2 What factors effects project management success at Schenker?

RQ3 How can the result be used to improve project management at Schenker and in organizations in general?

1.3 Company background

DB Schenker is a global corporate group and one of the worlds biggest suppliers of logistic services, with presence in 130 countries. The Swedish headquarter is located in Gothenburg and in 2016 Schenker AB's revenues totaled 13 billion SEK (Schenker AB, 2017). The IT division of Schenker AB is stationed in Gothenburg and is, with its around 100 employees, responsible for delivering IT services to the Swedish organization.

Schenker AB recently established a Project Management Office (PMO) for the IT division with the purpose of delivering the work done by the IT division through

a project process. The company has been using projects to deliver business objectives for a long time but have previously experienced difficulties with monitoring, evaluating and communicating project progress in a standardized and transparent way. Thus, the delivery reliability and accuracy of projects have been difficult to assess. In early 2016, implementation of a new project management software and a new standardized project process has enabled new data to be collected concerning the projects. This data can be used to evaluate the performance of the projects.

Schenker wants to develop a process to track the project's progress and evaluate their performance to be able to continuously improve the delivery reliability and communicate performance to upper management as well as the wider organisation. This thesis originate from the need to define goals for successful project management, what metrics to use to evaluate performance, implement a process to make use of available project data to form Key Performance Indexes (KPI) for actionable insights, and finally identify important factors for improving project delivery reliability.

2

Theory

2.1 Performance measurement

In order to address RQ1, we need to be able to measure project management success, and thereby it's performance. This section starts with a review of the broader subject of performance measurement, which include project management performance. Marques et al. (2010) argues that projects can be considered to be a business process, and thus practices on performance measurement systems, which originates from standard business processes (for example manufacturing) can be extended to project management.

2.1.1 Definition

Performance measurement is the process of quantifying actions that lead to performance, where measurement is the process of quantifying the efficiency and effectiveness of said actions (Neely et al., 1995). A performance measure is the metric used to quantify the efficiency and/or effectiveness of actions. If a set of metrics are used it is possible to speak of a performance measurement system. Performance measurement can thus be analyzed at three different levels (Neely et al., 1995):

1. Individual performance measure (metric).
2. The set of performance measures (performance measurement system).
3. The link between the performance measurement system and the environment within which it function.

2.1.2 Usage

According to Globerson (1985) it is important for every organization to identify and develop a performance measurement system which works as the basis for effective management planning and control. A fundamental part of any evaluation system is

to decide which criteria to evaluate, establish standards for those metrics and decide how often to measure. Neely et al. (1995) also found that the problem facing many companies are not deciding what they can measure, but instead reducing the list of available metrics to a manageable set. The authors highlights the need to examine the underlying reason to why a specific metric should be introduced. One way to do this is to develop metrics based on the company's strategy, so that metrics are introduced that reinforce the importance of the strategic direction of the company, instead of just measuring everything that can be measured. Hudson et al. (2001) reaffirms the need for companies to align their performance measurements systems with their strategic goals. Mir and Pinnington (2014) show that there is a positive relation between the use of Key Performance Indicators (KPI) to measure project progress and project success.

Simons (1991) argues that performance measurement can be used to steer a company's and individuals behaviour. Measures can be used as a way to supervise, motivate, monitor performance, and influence organizational learning. Simons (1991) also differentiate between interactive and non-interactive measurement systems. In an interactive system top managers use the system to personally and regularly influence decisions, and in such systems four conditions are typically present:

1. Insights from the system is regularly analyzed and considered an important activity by the highest levels of management.

2. The process of generating information demands frequent and regular attention from managers at all levels of the organization.

3. The underlying data is analyzed and discussed in face-to-face meeting between managers, subordinates, and peers.

4. The process demands continuous debate of underlying data, assumptions, and action plans.

Simons (1991) argues that through interactive performance measurement systems management can signal to the entire organization how information should be gathered, guide the search for understanding and promote organizational learning.

According to Globerson (1985) the following guidelines, that have been reiterated by Beamon (1999) and Gad et al. (2004), can be used to select and evaluate a set of performance criteria:

- Performance criteria must be chosen from the company's objectives.

- Performance criteria must be possible to compare with other organizations which are in the same business.

- The purpose of each performance criterion must be clear.

- Data collection and methods of calculating the performance criterion must be

clearly defined.

- Ratio-based performance criteria are preferred to absolute number.
- Performance criteria should be under control of the evaluated organizational unit.
- Performance criteria should be selected through discussions with the people involved (customers, employees, managers).
- Objective performance criteria are preferable to subjective ones.

2.2 Defining project management success

The use of projects as a vehicle to achieve business objectives has increased over the past decades (Papke-Shields et al., 2010; Todorović et al., 2015). Along with increased business practice and growth in membership of project management professional bodies the subject of project management has received large interest from scholars (Cooke-Davies, 2002). However, despite column-miles of studies and publications the academia fails to present a consistent interpretation of the term "project success" (Baccarini, 1999; Thomas and Fernández, 2008). In an extensive review of literature on project success Müller and Jugdev (2012) concludes that no clear definition exists and stresses the need for measurable constructs of project success.

Projects are by definition an unique and temporary organization (Wit, 1988) and varies in size, context and complexity. Thus, criteria for measuring the success of a project varies (Mir and Pinnington, 2014) and a general definition of project success and ways to assess it is therefor unlikely (Westerveld, 2003). The task is further obstructed by different interpretations and criteria of success from different stakeholders (Mir and Pinnington, 2014).

With project management research still in its early stages studies on project success focused on the three aspects of cost, time and quality (Cooke-Davies, 2002), also called the "iron-triangle" (Papke-Shields et al., 2010). These dimensions of performance are still considered highly relevant and frequently used in practice for assessment of project success (Wit, 1988; Scott-Young and Samson, 2008; Papke-Shields et al., 2010). However, in the 80s scholars start to argue that project success goes beyond the iron-triangle and is a multi-dimensional construct (Wit, 1988; Baccarini, 1999). This gave raise to the commonly used distinction, formulated by Cooke-Davies (2002), between project management success, measured by time, cost and quality, and project success, measured by the overall satisfaction from project stakeholders. Lavagnon (2009) found in his review that many authors in project management research, either implicitly or explicitly, appear to treat project success as something more than project management success (see Figure 2.1). Project success is thus more difficult to measure as it takes in to account client satisfaction,

perceived value of the project and benefits realization (Thomas and Fernández, 2008).

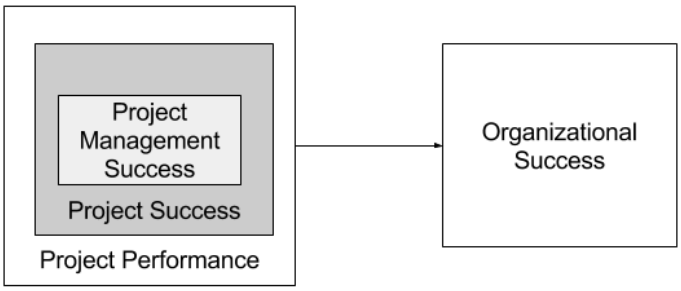

Figure 2.1: Linking project performance with organizational success, adapted from Barclay and Osei-Bryson (2010)

Following from the definition of project management success and project success is the fact that the two constructs are not always correlated. Wit (1988) argues that even if a project fails to deliver on time and and budget (project management failure), it can still be regarded as a success by its stakeholders (project success). Furthermore, a project that delivered pre-schedule and under budget (project management success) can be regarded as a failure if the benefits are not fully realised or the stakeholder expectations are not met (project failure).

2.3 Project management success metrics

Having established the distinction between project management success and project success it is necessary to elaborate further on how project management success is measured. As mentioned earlier project management success is measured according to the traditional "iron-triangle" of time, cost, and quality.

2.3.1 Time

All projects are constrained to a time frame during which they are to be completed. No projects are intended to continue forever. Thus, one of the basic requirements that control project management and determine its success is whether it is completed on established schedule (Pinto, 2013).

2.3.2 Cost

All projects are constrained to a limited budget, no company has unlimited resources to spend on projects. Project also compete for resources between each other. In

order to use resources efficiently projects must adhere to approved budget. Thus the second requirement that control project management is whether it is completed within budget guidelines or not (Pinto, 2013).

2.3.3 Quality

All projects are produced to meet to some form of technical specification determined at project initiation. Thus measuring success equals determining to what extent the project fulfills the specification (Pinto, 2013).

2.4 Project management critical success factors

As mentioned in the introduction, critical success factors (CSF) is a common topic in project management research. The previous research done on critical success factors in project management have often been performed based on construction projects. In recent years studies done on agile software development projects have increased (Chow and Cao, 2008). However, studies done on CSFs for IT projects are still quite sparse. Our research therefore aims to enrich the studies of CSFs in IT projects.

Iyer and Jha (2005) did a literature review of CSFs in project management as a foundation for their research on Indian construction projects. Fortune and White (2006) reviewed 63 publications in their paper on CSFs in project management (see Table 2.1). Fortune and White (2006) used their literature review as a basis to develop a framework that the authors subsequently applied empirically to two IS projects. There is significant overlap of sources between the two reviews by Iyer and Jha (2005) and Fortune and White (2006). It is also noteworthy that Fortune and White (2006) review shows that there is only limited agreement among authors on what factors influences project management success. 81% of the articles include at least one of the three most cited factors: support from senior management, clear realistic objectives, and detailed plan. But only 17% include all three.

Lavagnon (2009) elaborates on this issue, and writes that research on CSFs and success criteria has shown that it is impossible to produce an exhaustive list of CSFs that apply to all projects. This again is due to the fact that both CSFs and success criteria differ a great deal from project to project due to differences in variables such as scope, uniqueness, and complexity.

Table 2.1: Summary of Fortune and White (2006)'s review on project management success factors

Critical factor	Count of citations
Support from senior management	39
Clear realistic objectives	31
Strong/detailed plan kept up to date	29
Good communication/feedback	27
User/client involvement	24
Skilled/qualified staff/team	20
Effective change management	19
Competent project manager	19
Strong business case/sound basis for project	16
Sufficient/well allocated resources	16
Good leadership	15
Proven/familiar technology	14
Realistic schedule	14
Risk management	13
Project sponsor/champion	12
Effective monitoring/control	12
Adequate budget	11
Organizational adaption/culture/structure	10
Good performance by suppliers/consultants	10
Planned close down/review	9
Training provision	7
Political stability	6
Correct choice of project management methodology	6
Environmental influences	6
Past experience (learning from)	5
Project size (large)	4
Different viewpoints (appreciating)	3

The CSFs identified by previous authors will be used as a basis for our study of the factors that are important for project management success at Schenker. Below follows a definition and description of the factors that will be included in the study.

2.4.1 Support from senior management

Senior management support can be defined as willingness of top management to provide the necessary resources and authority/power for project success (Pinto and Slevin, 1987; Scott-Young and Samson, 2008). In their study Scott-Young and Samson (2008) measured support from senior management through senior management's responsiveness to request for resources, shared responsibility of ensuring project success, support in case of crisis, granting authority and supporting decisions regarding the project. Senior management support contributes to project success through political backing and aligning resources with the needs of the project. Support from senior management is the most cited factor and has for a long time been considered of great importance when distinguishing between a projects ultimate success or failure (Pinto and Slevin, 1987).

2.4.2 Clear realistic objectives

Several authors have discussed the importance of setting clear realistic objectives and goals at the start of a project (Pinto and Slevin, 1987). Shared and clear goals and objectives that are aligned with the company's strategy have been linked to project performance (Scott-Young and Samson, 2008). Among the dimensions that Scott-Young and Samson (2008) identified through their literature review and subsequently used in their study were: the project goals are aligned with the general goals of the organization, the goals were clear to the project team and the project results will be beneficial to the organization.

Clarke (1999) writes about scope and objectives as the guiding principles that direct the effort of the project team. The lack of a well-defined scope might obscure the project objectives and people may lose sight of what they are trying to achieve. Through the establishment of key objectives the team can focus on the target, create commitment and agreement about the project goals.

2.4.3 Detailed plan kept up to date

Project schedule/plan refers to the importance of developing a detailed plan of the required stages, milestones, and resource requirements of the project (Pinto and Slevin, 1987). As defined by Pinto and Slevin (1987), project schedule/plan refers to the degree to which time schedules, milestones, manpower, and equipment requirements are specified. The authors also states that the schedule/plan should include a measurement system to be able to monitor and evaluate actual performance to time and cost budget.

In a study of 176 IT-projects by Whittaker (1999) poor project planning was found to be the most common reason for project failure. Incorrectly estimated activity

durations were cited as the most common deficiency of project plans.

Clarke (1999) also writes about the need to update project plans regularly. However, if plans are too detailed a risk is that every time an aspect of the project changes, the plan will need to be updated as well, even if the goals or objective remain unchanged. This process then becomes time consuming and ineffective. By keeping the plans simple, with just the right level of detail, plans becomes useful communication and monitoring tools for the project.

2.4.4 Good communication and feedback

Good communication and available communication channels are important for successful projects. The factor refers to both communication within the project teams, with clients/users, and the rest of the organization (Pinto and Slevin, 1987).

Pinto and Mantel (1990) defines good communication as "the provision of an appropriate network and necessary data to all key actors in the project implementation" and concludes it to be a significant factor for project implementation on schedule and on budget in a study of 97 projects.

2.4.5 User/client involvement

The user or client of a project is anyone who will be using the result of the project, either as an external customer or internally within the company. User/client involvement is defined by Pinto and Mantel (1990) as "communication, consultation, and active listening to all impacted parties". Involving the user/client has been found to be important in successful project implementation (Pinto and Slevin, 1987).

In the study by Pinto and Mantel (1990) no significant relationship was found between client involvement and time or cost performance. However, researchers found the factor to be significantly related to client satisfaction.

2.4.6 Project manager's experience

According to Belassi and Tukel (1996) the very first research on success and failure factors of project was done by Rubin and Seelig (1967). They investigated the impact of a project manager's experience on the project's success or failure. It was concluded that a project manager's previous experience has minimal impact on the project's performance, whereas the size of the previously managed project does affect the manager's performance. Yet the competence and experience of the project manager continue to be considered an important factor for project success (Fortune and White, 2006).

2.4.7 Risk management

Problem areas exist in almost every project. It does not matter how carefully the project was planned, it is hard to know all risk and problems at the start of the project (Pinto and Slevin, 1987). Risk management refers to identification of potential problems, ability and plan to handle unexpected event and deviations from the plan (Slevin and Pinto, 1986).

Whittaker (1999) found that unaddressed risks was a common reason for failure in IT-projects with slippage from the schedule cited as the most important risk not adressed in the project planning.

2.4.8 Effective monitoring and control

Monitoring and control refers to the project control process where project stakeholders get feedback on how the project is doing compared to initial planning through out the different stages of the project. Through monitoring and control mechanisms the project manager is able to identify potential problems, take corrective action and make sure that no deficiencies are neglected (Pinto and Slevin, 1987).

Shenhar et al. (2002) found monitoring of schedule objectives to be a critical variables under high uncertainty levels and monitoring of budget objectives to be critical under low uncertainty levels.

2.4.9 Clear and defined specification

Work breakdown structure (WBS) is a technique to develop clear and defined tasks from a specification. WBS organises and defines the overall scope of a project by dividing the total project work into smaller, more manageable pieces of work. Each level further down the WBS represents an increasingly detailed definition of the task. One of the benefits of WBS is that at project resolution, the use of WBS ensure that all project work has been performed and that all requirements have been fulfilled (Patanakul et al., 2010).

According to Shenhar et al. (2002) using a detailed WBS is important, especially in high-uncertainty projects. In projects with lower uncertainty it is more important to oversee budget spend and technical performance goals.

3

Methods

3.1 Research approach

The thesis was carried out at Schenker AB's office in Gothenburg from January to May 2017. The researchers were present at the office during office hours, actively participating in meetings and discussions. The research follows earlier work at the company conducted by one of the researchers during 2016. The demand for this thesis was identified during summer and fall of 2016. The purpose and problem formulation emerged through a discussion between the researchers and the portfolio manager at the company.

To answer the research questions this research was performed in two phases, a qualitative phase followed by a quantitative phase. This mixed methodology is argued by Bryman (2006) to be appropriate when the to two different methods are aimed at answering to different research questions (in this case qualitative method for RQ1 and quantitative method for RQ2). Frels and Onwuegbuzie (2013) show that, when combined, the use of both qualitative and qualitative research can enhance intrepetations of the results. Johnson and Onwuegbuzie (2004) argues that this mixed methodology approach frequently results in superior research compared to mono-method research.

The first step was to investigate how project management success is defined and measured at Schenker. This was done using a qualitative research method combining interviews with a literature review. Bryman (2006) argues this research approach is most suitable to address more open ended questions like RQ1. Once a definition was established the research entered the second phase. This phase focused on the question of what factors that affect project management success at Schenker. This was answered by conducting a literature review to identify common success factors for project management. The identified factors led to a conceptual model that was tested on a sample of 29 projects at Schenker. Data was collected by a survey and analyzed using statistical analysis. This quantitative approach is argued by Bryman (2006) to be well suitable for answering more constrained questions like RQ2. Below we describe the method for the two stages in two parts. We begin with describing the first qualitative phase used to answer RQ1 and follow with a description of the quantitative research performed to test the conceptual model and answer RQ2.

3.2 Qualitative research

In order to answer RQ1 we developed a project management performance evaluation system. The purpose of this system was to provide an aggregated performance view of all the projects in the IT project portfolio. The project performance evaluation system also works as a semi-automated analysis tool for producing project performance reports. This system consisted of a set of project performance metrics which was presented to employees at the IT Division during interviews. The system worked as a platform for identifying and constructing the definition of project management success at Schenker and formulating project success criteria.

The system was developed in collaboration with the IT department at Schenker. In order to determine what project performance metrics to include in the performance evaluation system, an initial requirements specification was gathered through semi-structured interviews with a project portfolio manager and project portfolio controller. In parallel, a literature review of theory on performance evaluation was conducted. The findings from the litterateur review formed the basis for the performance measures and metrics that were developed to evaluate project performance. During the development bi-weekly feedback sessions were held together with Project portfolio manager, project portfolio controller, release manager and two project managers. These one hour feedback sessions were semi-structured with a predetermined agenda: first the most recent changes and developments were presented by the researchers, then feedback was gathered from the attendants of Schenker, and last future developments were proposed by all of the meeting attendants. The feedback sessions were complemented with more informal meetings with managers or project managers throughout the duration of the study.

The aim of this iterative and collaborative development of the project performance evaluation system was to identify the definition of project management success. To be able to answer what factors that affects project management success we needed the definition of the output variable. The definition found in this qualitative phase was used set up the output variables for the quantitative part.

3.2.1 Data collection

In total 12 semi-structured interviews were held with focus on RQ1. These interviews had a total duration of 20 hours. All interviewed subjects were employees at Schenker and selected using a snowballing approach. As these interviews were held in a regular meeting setting, often with several stakeholders present at the same time, the decision was taken not to record the interviews. The aim was to facilitate a natural conversation between us and the stakeholders. We took notes and after each interview we read through the notes and summarized them in order to validate that we both interpreted the answers in the same way. The following positions were interviewed: project managers, portfolio manager, portfolio controller and change

manager.

To answer RQ1, the information from the interviews were complemented with a literature review on performance measurement, performance evaluation, project success and project KPIs. Other keywords used were: "Critical success factors", "project performance", "project failure", "performance analysis", "success definition", "unsuccessful project", "portfolio management".

3.3 Quantitative research

The project performance evaluation system and the formulated project success criteria was the basis for the second part our research, which relates to RQ2 and aim to identify what factors influence project management success or failure. This study follows the broad design used by Mir and Pinnington (2014). A detailed description of this process follows below.

3.3.1 Conceptual model

Based on the literature review we propose a conceptual model (see Figure 3.1). Previous research highlights a large set of factors (independent variables) that may influence project outcome. A list of the 20 most frequently mentioned factors was validated and evaluated on their relevance to the specific company context. Through the process of interviews and observations this resulted in a final selection of nine factors. We hypothesize that these nine factors are related to project management success (See Figure 3.1).

The majority of previous research has modeled project management success as a single output variable, simultaneously consisting of both dimensions of schedule and budget. In this study we follow Scott-Young and Samson (2008), and choose to model the two output variables separately. This allows us to distinguish between factors that are significant for project schedule success and factors significant for project budget success.

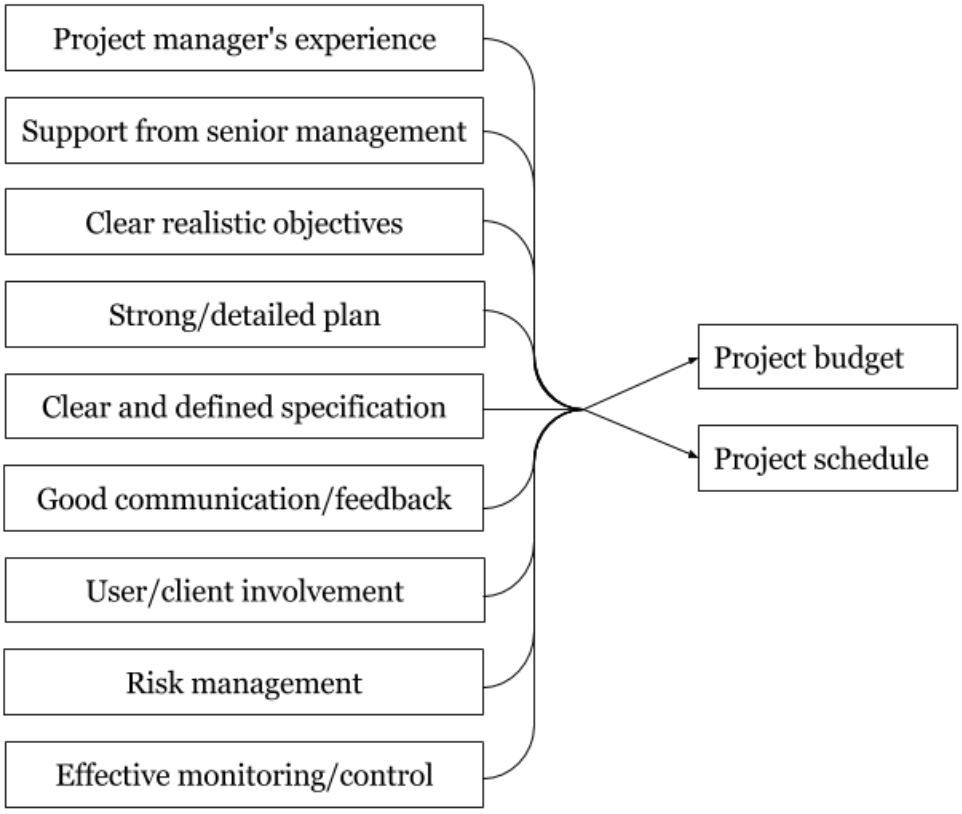

Figure 3.1: Conceptual model

3.3.2 Data collection

Data was collected through a survey directed to project managers at Schenker AB (see Appendix A). The questionnaire was sent out to respondents before the interview in order to familiarize the respondent with the questions. The survey was then filled out together during the structured interview. One of the researchers read each question out aloud and the project manager's response was filled out by the other researcher. This particular method of filling out the questionnaire together with the project manager during an interview enabled the project managers to ask questions directly to the researchers if anything in the statements of the questionnaire were unclear. This method was chosen over simply distributing the survey to the project manager to ensure high response rate and mitigate the risk of misinterpretations of the statements.

Each interview session was initiated with a set of semi-structured questions regarding the project and then the project manager was asked to quickly summarize the project in a few sentences. This was done to familiarize the researchers and refamiliarize the respondent with the project. A summary of each project with key data points, such as project name, start and end dates, costs, and client was attached to each survey to help remind the respondent of the project.

Responses for project outcomes were checked against recorded project data (budget, start date, end date, team size, responsible project manager, client, etc.) in archival documents. When discrepancy between perceived success and archival data was presented, a discussion followed in order to understand the source of divergence. As such our research followed a two source strategy, relying on both archival data and perception from project manager's. The interviews ranged from 15 minutes to an hour depending on the number of projects conducted by the project manager. In total 11 interviews with 11 project managers were held.

3.3.3 Sample

The sample consisted of 29 IT-projects at Schenker AB. Example of the type of projects were: software implementation, new product offerings, system mergers/integrations, system replacements, and hardware integrations. The total budget for the projects ranged from 99 000 SEK to 11 400 000 SEK. The duration of the projects ranged from 2 months (55 days) to 4 years (1460 days). The team size of the projects ranged from 2 people to 15 people. Nine of the projects were managed by an outside consultant. Table 3.1 presents range and mean for budget, duration, and team size in the sample.

Table 3.1: Projects in sample

Variable	Min	Max	Mean
Budget (SEK)	99 000	11 400 000	1 293 736
Duration (days)	55	1460	393.7
Team size (members)	2	15	5.9

Projects at Schenker follows Schenkers project model which consists of different phases: classification, prioritization, project backlog, initiation, planning, execution, implementation & closure, resolved, cancelled, and rejected. The following sample criteria was used:

- to only include projects that either were resolved or ongoing (in phases: planning, execution, and implementation & closure).
- to only include projects mananaged by project managers at the PMO.
- to only include projects of a certain size (excluding what is classified by Schenker as Small Projects).

Random probability sampling was not feasible due to the fact that the Project Management Office (PMO) at Schenker was created just a year before the start of the study. This limited the amount of projects that had reached a stage at which it was possible to collect data for. It was also important to not include projects

that were not representative of the project population at Schenker in the sample. Through interviews with key personnel at the company we have verified that the characteristics of the sample generally match the characteristics of a project at Schenker.

3.3.4 Measures

Presented below are the set up for the variables used in this study. Dependent variables being schedule and budget performance and the independent variables the suggested critical success factor that were tested.

Dependent variables: project outputs

To assess the two output variables (schedule precision and budget precision) archival data were combined with the more subjective perception of the project manager. This was done to give a more nuanced view of project management performance by being able to control for significant change in factors external to the project. Schedule precision and budget precision were evaluated separately using a single measure on a five-point Likert-scale for each. This measure was a combined assessment where the responding project manager was asked to combine objective (numbers from archival data) and subjective (perception from project manager) information with no predetermined weights.

Independent variables: project inputs

Each factors were measured by three validated questions picked from the set used by Slevin and Pinto (1986). Questions were chosen according to their relevance to the projects context at the IT division. For all factors, questions per factor were set to three to limit the total length of the survey. This resulted in a selection of 27 questions, three for each of the nine independent variables. With a few exceptions, questions were kept word for word. Where necessary, wording where changed to better fit the context of the survey.

For the project manager's experience variable questions from Rubin and Seelig (1967) were used. During previous interviews, the dimension of project specification and work breakdown emerged as a relevant factor to test. This factor had not been identified during the literature review. Thus, a final variable aimed at capturing to what degree the project specification had been broken down into smaller, clearly defined and more manageable tasks was included. Three questions were formulated to assess the degree of specification. Following the method used by Slevin and Pinto (1986), respondents were asked to answer all question according to a five-point Likert-scale ranging from 1=strongly disagree to 5=strongly agree. Factor-based

scores (SAS Institute (2017)) were computed for each factor, meaning that the three answers concerning the same factor where added together to form a possible score per factor between 3 and 15. The factor project manager's experience was measured in years of service with Schenker, total years of project management experience, number of previous projects managed, and thus is the only factor that does not range from 3 to 15. For all factors, the three questions for each factor was given the same weights in the combined factor score.

Instrument validity and reliability

The items used in the questionnaire were selected from The Project Implementation Profile developed by Slevin and Pinto (1986). Hence, the questions used in this study has been used in prior research. The items has been tested as a diagnostic instrument with practitioners and exhibits strong psychometric properties. In their research the Slevin and Pinto (1986) use ten statements to describe each of the ten factors. In this study we selected three statements for each factor to form the questionnaire. There exists a trade-off between the number of statements and total length of the survey. Including more statements would increase the reliability, but also demand more resources from the respondents. Utilizing three statements was deemed sufficient to capture the essence of each factor. A reliability analysis was performed on the sample to ensure instrument reliability. All factors were tested for Cronbach α (see Table 4.2). Cronbach α is a common measure of reliability. It is an index of the internal consistency of a variable (in this study the CSFs) that is formed by combining a set of items (Easterby-Smith et al., 2015).

The specification variable included in this study has not been tested in prior research. No instruments for this factor was found during the literature review. Statements for the specification variable was therefore constructed. As a measure of reliability the three statements for specification shown a Cronbach α of 0.72 indicating that they sufficiently measures the same underlying construct.

The questionnaire was tested before distributed. This was done using two different methods. First, the questionnaire was shown to a researcher with experience in conducting survey-based research. Then, after adjustments were made based on the feedback from the researcher, a test interview was performed with project manager at Schenker. This test interview indicated the instruments selected from Slevin and Pinto (1986) to be applicable to the context of project management at Schenker.

3.4 Analysis of data

We have performed mainly three types of analysis on the collected data. Below follows a short explanation of each.

3.4.1 Comparing means

To test if there exists any difference between the group of projects that was delivered on schedule versus after schedule as well as on budget versus over budget we performed a t-test. As Easterby-Smith et al. (2015) describes the t-test is suitable when the objective is to compare the means of two groups. The size of the t-value that is obtained depends on three things: the difference in group means, the spread around group means, and the sample size of each group (Easterby-Smith et al., 2015). The t-test is set up through hypothesis testing, where the null hypothesis is that there is no difference between the groups. The null hypothesis can be rejected if the probability of getting a difference as big as the observed one is small enough.

The usual criterion is to use a significance level (commonly referred to as the level of statistical significance) of 5% (Easterby-Smith et al., 2015). In this study we use different significance levels, where one star indicates a significance level of 5% ($*p < 0.05$; $**p < 0.01$; $***p < 0.001$).

3.4.2 Correlation

To test if there is an association between two variables it is suitable to calculate correlation coefficients (Easterby-Smith et al., 2015). As we want to identify if there is any relationship between specific CSFs and the the project outcome in terms of schedule and budget, it is suitable to calculate correlation coefficients. The correlation coefficient indicates the strength of the association between any two metric variables. The sign indicates the direction of the relationship. +1 indicates perfect positive relationship, 0 no relationship, and -1 perfect negative relationship (Hair et al., 2014). As Easterby-Smith et al. (2015) writes, when the measurement scales are continuous the test of choice is the Pearson product-moment correlation. This is the case with all of the variables in the study, as such we employ the Pearson product-moment correlation in the subsequent analysis.

3.4.3 Multiple regression analysis

Multiple regression analysis is a statistical technique that can be used to analyze the relationship between a single dependent variable and several independent variables. The objective of multiple regression analysis is to use the independent variables (whose values are known) to predict the dependent variable (Hair et al., 2014). As this is one of the objectives of our study, to identify if there is any relationship between the CSFs (independent variables) and project management success (dependent variables), multiple regression is a suitable method for this study. To assess the predictive accuracy of the regression model the most commonly used measure is the coefficient of determination (R^2). R^2 is calculated as the squared correlation between the actual and predicted values of the dependent variables. R^2 ranges from

0.0 (no prediction) to 1.0 (perfect prediction) (Easterby-Smith et al., 2015).

A possible issue in regression analysis is the presence of multicollinearity. Multicollineaeity occurs when any single independent variable is highly correlated with with a set of of other independent variables. To measure multicollinearity variance inflation factor (VIF) can be calculated. VIF is an indicator of the effect that the other independent variable have on the standard error of regression coefficient. A large VIF indicates a high degree of multicollinearity among the independent variables (Hair et al., 2014). The results of the VIF analysis are shown in section 4.2.4

3.5 Limitations

As for the limitations of the overall research methodology, one limitation of the study is the focus on one single firm. The possible disparity between firms and other industries not covered by this study will be missed. The findings of our study might not be directly applicable to other firms than the one studied. The vision is for future research to expand on this study to include additional industries and firms.

Regarding the survey research design, one limitation is the usage of project managers subjective rating of perceived project outcome. Previous research has shown that a limitation of subjective ratings is that result may vary depending to whom is asked. A project manager's perception often differs from other stakeholders perception (Campion et al., 1993; Hoegl et al., 2001). This was minimized through the use of archival data. To deal with this issue further, other stakeholders such as upper management and project team members perception could also have been assessed. Due to time constraints this was not possible.

Another issue with using self-assessed and subjective ratings was identified during the interviews and is evident from the descriptive statistics (see Table 4.2). Both the risk management and monitor & control factor show that project manager's tend to rate their risk management and monitor & control effort somewhat high. Both these factors measure the project manager's ability, and thus it is not surprising that an individual do not want the statements to reflect badly on them. A better design, with more or different statements could possibly reduce the risk of self-reporting bias.

Moreover, when trying to generalize the results of this study the limited sample size needs to be taken into account. It should be noted, as with all regression based results, that the findings should only be interpreted as general relationships found within our data set. The convenience nature of our sampling strategy did not allow us to estimate any sampling error. The impact of this strategy was minimized through careful validation with key stakeholders at Schenker to ensure that the sample was representative of the total project population. Also, since our sample only concerned IT projects executed at Schenker AB, caution should be exercised

when trying to generalize the findings to other contexts. Finally, the quantitative research design is only able to show correlations and possibly imply, but not prove any causal relationships.

4

Results

The results are presented following the order of the research questions. First the findings related to RQ1, how project management success is defined and used at Schenker, are presented and analyzed. Secondly the results related to RQ2, regarding what factors influence project management success or failure, are presented. Finally, implications connected to RQ3, how the results can be used to improve project management at Schenker and organizations in general, are discussed in the following chapter.

4.1 Defining and measuring project management success

One of the main takeaways from our interviews is that project management success at Schenker is defined by a projects adherence to schedule and budget objectives. More specifically, the criteria for project management success is a project delivered within 10% of approved time frame and budget. Whether a project that has been delivered fulfills the quality or scope requirements are not measured. According to the interviews the company is still to early in its project evaluation process to account for adjustments in scope or measure quality after delivery.

The interviews pointed to a process were the project manager presents a project plan, including schedule and budget specification, based on estimates and forecasts. Depending on the size of the project and resources needed the plan needs to be approved by different levels of the organization. The closest executive organ for project conducted at the IT-division is the IT management board which needs to approve all project plans before initiation. This plan forms the basis for the evaluation of project management success. The project outcome is evaluated against the approved forecasts, deadline and budget of the project plan.

4.1.1 Performance measurement system

Our interviews show that the set of project management success metrics is measured in what Neely et al. (1995) refers to as measurement system. The system used by Schenker aggregates data from all projects in the project portfolio. This enables analysis and data drill-down to track and communicate performance of specific project programmes or projects assigned to a specific customer. The performance measurement system also allows Schenker to track performance over time and identify trends. Simons (1991) differentiate between interactive and non-interactive measurement systems. In an interactive system top managers use the system to personally and regularly influence decisions. From our research at Schenker it is evident that the measurement system meet all of the four conditions presented by Simons (1991):

1. Insights from the system are presented and discussed at monthly meetings.
2. Information to the system rely on reporting from project managers.
3. The underlying data is discussed between project managers and management.
4. As the system is still quite new, the process of generating and reporting data to the system demands continuous debate.

Thus, the measurement system can be classified as an interactive system, which according to Simons (1991) is beneficial to the organization, as it guides information gathering and promote organizational learning.

4.1.2 Performance evaluation

The project management evaluation method used by Schenker will in the following section be analyzed using the guidelines first presented by Globerson (1985) and reiterated by Beamon (1999) and Gad et al. (2004).

Performance criteria chosen from company objectives

Schenker expressed during interviews that delivering solutions at a low cost to maximize corporate profits is a clear objective of the company. As argued by Cooke-Davies (2002) schedule or budget overrun translates directly to the bottom line. By choosing schedule and budget precision as performance criteria the performance of projects becomes directly linked to the financial performance of the company and can there by be seen as chosen from the company objectives.

Performance criteria possible to compare with other organization in the same business

The criteria chosen by Schenker are simple and applicable to different organisations, and even different industries. Choosing time and budget precision allows for comparison between companies in the same business. The interviews unveiled that the IT division at Schenker has a mission to become the business leader in providing internal IT services. However, to be able to compare Schenker's performance to its competitors access is needed to the corresponding figures of the competing company. In the highly competitive business of logistic services such figures are not made public.

There is, however, the possibility to compare Schenkers performance against the result presented in aggregated reports provided by consultancy firms and other institutions. The data from such reports are often more general and seldom business specific, but will enables some comparison against the performance of other companies.

The purpose of each criterion must be clear

The purpose of measuring schedule and budget is motivated by resources at the company being scarce as expressed by several of the interview objects. There is always an alternative way to use resources (manpower and money) other than on the project they have been assigned. One person explained this is also the reason a significant schedule or budget underrun is regarded as a failure. The planned resources assigned to the project are tied up and could have been in use in an other project. Big underruns complicates portfolio planning.

Data collection and calculating methods for performance criterion must be clearly defined

The performance evaluation system developed in collaboration with Schenker involves a standardized process for data collection. The data is provided by the project managers into a software program. The data is then exported and fed into the performance evaluating system which generate a report. The system uses consistent and predetermined calculating methods for all performance measures.

However, project managers expressed some problems with the data reporting structure currently in use. A lot of the data reporting is made manually, relying on project managers to regularly update the data on the projects they manage. There is no system in place to ensure data quality. One manager explain that they during the early stage of this process the focus has been data completeness and that data quality is the next natural step towards a more robust system.

Ratio-based criteria are preferred to absolute numbers

The schedule and budget performance is measured as the ratio of deviation from plan and planned schedule or budget. This generates a ratio-based metric which allows for comparison between projects of all sizes. Consensus from the interviews is that if a project deviates more than 10 % from its planned schedule or budget, it is seen as a failure.

Performance criteria should be under control of the evaluated organizational unit

At Schenker the performance criteria is formulated by the IT Division and is controlled by the IT management board. The project manager is in control of the project activities and is responsible for delivering on schedule and on budget. However, several project managers says there is the possibility of external events occurring that is out of the project managers control. If such external events affects the project schedule or budget the project plan can be revised after approval from the IT management board.

Performance criteria should be selected through discussions with people involved

The performance evaluation system and its performance criteria has been selected and developed in close collaboration with the stakeholders involved at Schenker. Project managers, employees responsible for managing the performance evaluation system and upper management were all included in the development.

Objective performance criteria are preferable to subjective ones

Comparing planned schedule and budget to actual project outcome with a predefined allowed deviation of 10% makes the criteria objective. Project management performance will be interpreted consistently through out the organization minimizing the risk of conflicting views on performance.

However, as all project are unique and varies in complexity (Wit, 1988) there is the possibility of the perceived achievement of delivering a project on schedule and on budget varies. This ties back to the guideline of stating and communicating the purpose of each criterion. By stating that the purpose of the performance metric is to control and incentivise adherence to schedule and budget the risk of mixed subjective views of special project management achievement are mitigated.

4.2 Critical success factors

Having established how project management success is defined and used at Schenker, we now turn to RQ2, what factors influence project management success or failure. Below follows the results of the survey performed on 29 IT projects at Schenker.

4.2.1 Summary statistics

Table 4.1 presents the descriptive statistics for each statement of the questionnaire (see Appendix A for questionnaire). These statements are used to assess the dependent and independent variables. Each factor from the conceptual model was assessed through three statements. The statements has been coded in the table below according to the corresponding factor and its number. For example PM experience 1 refers to the first statement that assesses project managers experience: "Years of total project management experience".

Table 4.1: Descriptive statistics for all statements

Variable	*N*	Mean	S.D.	Min	Max
Schedule	29	3.48	1.21	1	5
Budget	29	3.76	1.09	1	5
PM experience 1	29	7.48	3.52	2	17
PM experience 2	29	15.72	6.16	4	25
PM experience 3	29	6.14	7.77	0	22
Management support 1	29	4.03	0.94	2	5
Management support 2	29	4.00	1.00	2	5
Management support 3	29	3.69	1.07	2	5
Clear objectives 1	29	4.10	1.11	1	5
Clear objectives 2	29	4.38	0.68	2	5
Clear objectives 3	29	3.90	0.94	1	5
Planning 1	29	3.93	1.16	1	5
Planning 2	29	4.10	1.05	1	5
Planning 3	29	3.69	1.17	1	5
Specification 1	29	3.48	1.18	1	5
Specification 2	29	3.59	1.09	2	5
Specification 3	29	3.38	1.12	2	5
Communication 1	29	4.07	1.00	1	5
Communication 2	29	4.00	0.76	2	5
Communication 3	29	3.72	1.13	1	5
User involvement 1	29	4.03	0.73	2	5
User involvement 2	29	3.97	0.94	2	5
User involvement 3	29	3.86	0.99	2	5
Risk management 1	29	4.03	0.91	1	5
Risk management 2	29	4.38	0.68	3	5
Risk management 3	29	3.9	0.9	2	5
Monitor & control 1	29	4.17	0.97	1	5
Monitor & control 1	29	4.03	0.73	2	5
Monitor & control 1	29	4.24	0.58	3	5

Table 4.2 shows the descriptive statistics after each statement has been summed to form the factor-based score, resulting in the independent variables in the conceptual model. The table also presents the Cronbach's alpha performed on the items forming the independent variables. In general alpha's above 0.7 are recommended, but for exploratory studies levels above 0.5 could be acceptable (Nunally, 1967). Thus,

all variable were acceptable, apart from the communication variable. As discussed in section 3.3.4 the survey is based on a previously validated and used instrument. It is possible that the difference is due to our modest sample size or because information was lost when certain questions were dropped. Since the instrument has been previously validated we decided to continue the analysis with all CSFs.

Table 4.2: Descriptive statistics for the CSFs

Variable	N	Mean	S.D.	Min	Max	α
PM experience	29	29.34	13.23	10	62	0.55
Management support	29	11.72	2.40	6	15	0.71
Clear objectives	29	12.38	2.06	7	15	0.59
Planning	29	11.72	2.64	7	15	0.68
Specification	29	10.45	2.72	6	15	0.72
Communication	29	11.79	1.97	7	15	0.40
User involvement	29	11.86	2.13	7	15	0.71
Risk management	29	12.31	1.81	9	15	0.55
Monitor & control	29	12.45	1.84	9	15	0.71

4.2.2 Comparing means

In order to compare if there exists any differences between high-performing and low-performing projects in regards to adherence to schedule and budget a comparison between the arithmetic means between the groups were done.

Two independent-samples t-test was performed with the null hypothesis that the average score of success factors for high performing and low performing projects are equal.

Prior to the t-test the 29 projects were divided into two groups, high performing and low performing. High-performing projects were classified according to the median value for the sample. For both schedule and budget performance the median is 4. Thus, projects with a rating of 4 (= Agree) or 5 (= Strongly Agree) were classified as high-performing. Project with a rating of 1 (= Strongly disagree), 2 (= Disagree), or 3 (= Neutral) were classified as low-performing.

Welch's t-test was used since it performs better than Student's t-test whenever sample sizes and variances are unequal between groups (Delacre et al., 2017; Ruxton, 2006), thus it is more robust. The means and any significance are presented in Table 4.3.

Table 4.3: Comparing means

Variable	Schedule		Budget	
	Low (n=13)	High (n=16)	Low (n=10)	High (n=19)
PM experience	30.92	28.06	26.30	30.95
Management support	10.46	12.75**	10.50	12.36*
Clear objectives	12.00	12.69	11.60	12.79
Planning	11.31	12.06	10.30	12.47*
Specification	10.08	10.75	11.10	10.11
Communication	11.15	12.31	11.00	12.21
User involvement	11.85	11.88	11.20	12.21
Risk management	11.54	12.94*	11.10	12.95**
Monitor & control	12.00	12.81	11.20	13.11**

Level of significance: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

Table 4.3 shows that for schedule performance the group of high-performing projects had a higher mean than the low-performing group for all factors except for PM experience. The difference in means were statistically significant between the high- and low-performing projects on the factors management support and risk management.

For budget performance all factors except specification had a higher mean value in the high-performing group. The difference in means were statistically significant between the high- and low-performing projects on the factors management support, planning, risk management and monitor & control.

4.2.3 Correlation matrix

Pearson's r bivariate correlations were performed for all variables measured at project level (n=29). These are presented in Table 4.4.

Table 4.4: Correlation matrix

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Schedule	1										
2. Budget	.55**	1									
3. PM experience	-.20	-.01	1								
4. Management support	.60***	.61***	-.35	1							
5. Clear objectives	.25	.39*	-.35	.46*	1						
6. Planning	.23	.48**	-0.18	.54**	.46	1					
7. Specification	.18	.10	-.58***	.31	.35	.47*	1				
8. Communication	.43*	.37*	.03	.49**	.53**	.23	.18	1			
9. User involvement	.26	.43*	-.20	.38*	.42	.41*	.18	.31	1		
10. Risk management	.51**	.63***	-.27	.48**	.26	.28	.46*	.53**	.13	1	
11. Monitor & control	.36	.64***	-.11	.42*	.61***	.53**	.43*	.67***	.46*	.61***	1

Level of significance: $*p < 0.05$; $**p < 0.01$; $***p < 0.001$. The significant test tests against the alternative hypothesis that the true correlation is not equal to zero.

Table 4.4 shows that schedule outcome is positively correlated with the management support factor (significant at the 0.001 level), the communication factor (significant at the 0.05 level) and the risk management factor (significant at the 0.01 level).

The analysis also shows that in the present sample budget outcome is positively correlated with the management support factor, the risk management factor, and the monitor & control factor (significant at the 0.001 level). It is also positively correlated with the clear objectives factor, the communication factor, the user involvement factor (significant at the 0.05 level), and the planning factor (significant at the 0.01 level).

It is also evident from Table 4.4 that many of the independent variables are as strongly correlated with each other as with the dependent variables. To test the conceptual model we need to tease out these relationships, and thus we continue with multiple regression analysis (Easterby-Smith et al., 2015).

4.2.4 Regression analysis

The purpose of this study is similar to Chow and Cao (2008), which use multiple regression analysis to model different project outcomes. We also applied multiple regression to find out which independent variables (CSFs) impact the dependent variables (adherence to project budget and project schedule) and to establish the relative predictive importance of the independent variables. Unlike Chow and Cao (2008) and Scott-Young and Samson (2008) we decided not to perform stepwise

regression to refine the model. This was decided due to the risk that stepwise regression may produce misleading results (Easterby-Smith et al., 2015).

Two multiple regressions were performed, one with budget and one with schedule as dependent variable. As many of the independent variables are correlated with each other we tested the dataset for multicollinearity. To test if this was the case the model was measured with variance inflation factor (VIF). A VIF between 5 and 10 indicates high correlation that may be problematic. None of the factors in our model had a VIF above 5. The result from the multiple regression is presented in the tables below.

Table 4.5: Relation between schedule and CSFs

Variable	B	Std. Error	t-value	p-value
Intercept	-1.53	2.42	-0.64	0.5332
PM experience	-0.00	0.02	-0.13	0.8950
Management support	0.24	0.14	1.81	0.0864
Clear objectives	-0.04	0.16	-0.28	0.7831
Planning	-0.05	0.12	-0.41	0.6878
Specification	-0.04	0.12	-0.33	0.7424
Communication	0.05	0.18	0.272	0.7886
User involvement	0.05	0.12	0.40	0.6917
Risk management	0.19	0.18	1.07	0.2990
Monitor & control	0.02	0.23	0.01	0.9302

$F = 1.748$ ($p = 0.1461$), $R^2 = 0.453$, Adjusted $R^2 = 0.1938$.
Level of significance: $^*p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$

Table 4.5 shows the results from the regression on schedule. Overall the model performed very poorly. We are not able to reject the null hypothesis that the fit of the intercept-only model and our model is equal. We can thus not conclude that our model provides a better fit than the intercept-only model (a model with no independent variables). The analysis also shows that none of the independent variables are significantly related to the schedule outcome of a project.

Table 4.6: Relation between budget and CSFs

Variable	B	Std. Error	t-value	p-value
Intercept	-4.27	1.14	-3.75	0.0013**
PM experience	0.02	0.01	1.94	0.0670
Management support	0.20	0.06	3.15	0.0053**
Clear objectives	0.10	0.07	1.34	0.1951
Planning	0.01	0.06	0.22	0.8277
Specification	-0.14	0.05	-2.56	0.0192*
Communication	-0.30	0.08	-3.57	0.0021**
User involvement	0.09	0.06	1.63	0.1187
Risk management	0.36	0.09	4.24	0.0005***
Monitor & control	0.25	0.11	2.31	0.0321*

$F = 11.87$ ($p = 4.484 \times 10^{-6}$), $R^2 = 0.849$, Adjusted $R^2 = 0.7775$.
Level of significance: $^*p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$

Table 4.6 shows the results from the regression on budget. Overall the model performed on the sample of projects accounted for 77.75% of the explained variance of budget performance (using the more conservative adjusted R^2). The model indicates that the management support, specification, communication, risk management, and monitor & control factors are all significantly related to the budget outcome of a project.

5

Discussion

After presenting the results, we now proceed to discuss the results in more detail as well as the implications for Schenker and other organizations in general. The discussion will follow the structure of the research questions.

5.1 RQ1

The definition of project management success used by Schenker and presented in this study is in line with theory in the field. Previous research has proved it common to use the definition of adherence to schedule and budget. These two criteria are relatively easy to collect data on, measure, compare, and communicate. The purpose of such metrics are two-fold. During the course of the project the metrics can be used to compare planned progress to actual progress. By monitoring these metrics the project manager can get signals of project health and use these signals to adjust forecasts or adjust resources and workload prior to final delivery or deadline.

However, there is one dimension of the iron-triangle that is neglected, the dimension of quality (or scope in some cases). This dimension differs from schedule and budget on two important aspects: measurability and objectivity. Although there is the possibility of defining a project as a set of smaller deliverables and measure the proportion of full-filled deliverables as a metric of scope, as soon as the term quality is introduced it becomes more subjective. A product deemed sufficient by one stakeholder can be deemed insufficient by another due to discrepancies in expectation and valued attributes. Furthermore, some aspects of quality (e.g. duration, life-span, maintenance) are unveiled well beyond project delivery. The dimension of quality is therefore difficult to assess at project closure, and, as in the case at Schenker, is often excluded from measures of project management success.

5.2 RQ2

This study was unable to provide a model that predicts project schedule performance. However, comparing means between high performing and low performing projects found a significant difference for management support and risk management, where means were higher. These two factors also proved to be positively correlated with schedule performance when studying Pearson's bivariate correlations. This is in line with the findings of Cooke-Davies (2002), which concludes risk management to be the most prominent success factor for schedule performance in a study of large multinational organizations. When studying CSFs in agile software projects Chow and Cao (2008) found a construct similar to risk management, called delivery strategy, to be significant for timeliness in projects. On the contrary, in a study of large construction projects Chan et al. (2001) did not find risk management to be related to project management success. The findings in this thesis is closer to the findings in Chow and Cao (2008) than Chan et al. (2001). This could possibly be explained by the nature and context of the sample projects in this thesis being closer to Chow and Cao (2008) than the sample in Chan et al. (2001). This could indicate a possible variation in significant CSFs between different types of projects (e.g. different set of CSFs for construction project and IT projects) which further strengthens the argument by Lavagnon (2009). Further research should control for the type of project when studying project management CSFs.

There are several possible explanations to the regression model for schedule performance being insufficient. One is that the relatively small sample size used in this study was not enough to reveal any relations. Second, the research design regarding how the survey was designed, what questions and how they were asked could also have impacted the results. There is a possible bias introduced when asking a project manager to evaluate his or hers own project, thus relying on self-reported data. In some sense they were putting scores on themselves. It is also very likely that other factors not accounted for in our conceptual model are linked to schedule performance. Again, as Lavagnon (2009) study on published research on project success highlights: previous research on CSFs and success criteria has shown that it is impossible to provide a complete list of CSFs that will be applicable to all projects. This further emphasize the necessity to conduct research in specific settings to develop the field of project management.

With budget performance as the dependent variable we were able to develop an explanatory model. The model suggest that management support, specification, communication, risk management and monitor & control is related to budget performance. This is well in line with findings of several previous studies and indicates that previously identified CSFs applies to the projects in our sample. Iyer and Jha (2005) concludes top management support and monitor & feedback to collectively explain over 20% of the variance in budget performance in Indian construction projects. Chua et al. (1999) found monitor & control, to be of importance when predicting budget performance.

In this study we manage to contribute to the question asked by Bakker et al. (2010) regarding the relation between risk management and budget success in IT-projects. In their meta-study they call for empirical evidence of the effect of risk management on budget performance of IT-projects. We manage to show a significant relationship ($p < 0.001$) between risk management and budget performance.

However, there are several factors that in this study fails to predict budget performance. Two factors that is commonly associated with project management (Fortune and White, 2006) success that gave insufficient predictor value in this study is clear objectives and user involvement. This again shows the paradox of providing an exhaustive set of CSFs for a random set of unique projects.

Planning showed a relatively strong and significant correlation with budget performance ($r = 0.48$, $p < 0.01$), but were not a significant predictor in the regression model for budget performance. This suggests that the correlation between planning and budget performance arises due to both variables are correlated with another variable. Planning shows significant correlations with both management support and monitor & control. Both these variables are in turn correlated with budget performance and significant predictors in the regression model. This implies that monitor & control is the factor predicting budget performance and that planning is correlated to monitor & control by being an obvious prerequisite. As such, a plan is need to have something to monitor and control against, but it is the activity of monitoring and controlling the plan that predicts budget performance.

Another finding in our study that confirms previous research (Rubin and Seelig, 1967) is that the experience of a project manager has minimal impact on project outcome. It is interesting to note that previous experience is negatively correlated with schedule and budget performance (although not statistically significant). A possible explanation of this is that more experienced project manager's are assigned bigger, more complex projects. Carvalho et al. (2015) found in their study, that confirms previous research (Cooke-Davies, 2002), that project complexity influences its performance. Thus, complex projects more often experience delays and budget overruns.

The findings show that separating project schedule and project budget performance, instead of treating them as one combined variable for project outcome, is important. This is in line with the findings of Scott-Young and Samson (2008). We have found that the CSFs treated in this study relates differently to schedule and budget outcome. Aggregating the two appears to hide the fact that different CSFs affect different project outcomes.

After studying the result of comparing the means, the correlation matrix and the regression we choose to summarize the following CSFs as related to project management success. The regression did not produce an explanatory model for schedule performance, however when comparing the means of the high- and low-performing group management support and risk management were significantly higher in the high-performing group. The same conclusion can be drawn from the correlation

matrix. Thus, for schedule performance we argue that management support and risk management are critical.

For budget performance the regression did produce an explanatory model. Several factors were found significant in the model, however if we take a conservative approach and also consider the correlation matrix as well as the comparison of means two factors were not found significant in both results, namely specification and communication. Thus, we choose to only consider management support, risk management, and monitor & control as critical factors for budget performance. All these three factors were significant in all three results.

5.3 RQ3

We argue that the first step for organizations towards improved project management success is to agree on a clear definition of the term. Once a definition is established it can be formulated in terms of a set of measurable project management success criteria. These criteria should be carefully selected to make sure they align with overall company objectives and other guidelines presented in this study. The metric corresponding to each success criteria should be aggregated in an interactive performance measurement system. Insights from the system should be regularly analysed and underlying data should be continuously discussed. Performance should be communicated to all levels of the organisation, preferably through face-to-face meetings. By simply measuring project management success the performance can be improved, as shown by Mir and Pinnington (2014).

Focusing on CSFs is the first stage to improving project management (Clarke, 1999). Based on the Pareto rule of concentrating on the few things which deliver the greatest benefits, it is useful to focus the project management process improvements on the CSFs that lead to project management success. Then, as the business becomes more experienced and develops more project management skills, it can work towards achieving other factors linked to project management success.

The result of the examination on CSFs show that management support and effective risk management is important in order to achieve both schedule and budget performance. This is no surprise to either practitioners or researchers. However, achieving management support for the project can be hard in some cases. Several of the interviewees expressed that unsupportive management often contributed to project difficulties. That the amount of support management shows for a project directly impacts a projects likelihood of being delivered on schedule and budget, should demonstrate the need to ensure that management grants the necessary authority as well as support the decisions made within the project. It should be noted that we have only included project managers perception of management support, and that the view of upper management might differ. Risk management pertains to the project manager addressing problem areas, formulating contingency plans, taking action when problem arise, but also knowing where to turn in case of project

difficulties. Facilitating and encouraging proactive risk management increases the probability of both schedule and budget success. We also find monitor & control as an important factor for budget performance. Effective monitor & control means comparing actual progress again schedule and budget, monitoring the important aspects of the project, and also keeping management and team members informed of the status. An interactive and well design project performance measurement system facilitate project monitor & control, thus improving a projects budget performance.

The fact that our findings support the view that management support, risk management, and monitor & control are CSFs also highlight the importance of having clear definitions on project management success and project performance measurement systems in place, as this is a prerequisite of both effective monitor & control and risk management. Without the possibility to track project progress and outcome, monitor & control and risk management becomes impossible. An interactive measurement system also facilitate communication with management, and the opportunity for management to follow up project progress, resulting in higher levels of management support, which in turn improves project management success.

6

Conclusion

Through an empirical study we have investigated how the IT division at Schenker, a multinational logistic company, work with project performance measurement and define project management success. Furthermore, we have identified a set of CSFs that can be linked to project management success. The findings shows that:

- Schenker defines project management success as adherence to schedule and budget, which is in agreement with existing literature.
- We have also found that the project performance measurement system used can be classified as interactive and follows existing guidelines of how such a system should be designed.
- Regarding the CSFs, we found two CSFs linked to schedule performance, and three CSFs linked to budget performance.
  - For schedule performance we established links between management support and risk management to successful schedule performance.
  - For budget performance we established links between management support, risk management, and monitor & control to successful budget performance.

6.1 Contribution to theory

The main theoretical contribution of our study is that it extends existing project management theory by combining theory and empirical research on definitions of project management success with CSFs in IT projects. As Lavagnon (2009) writes few empirical studies have tried to investigate important links between CSFs and success criteria.

Our findings also yield some interesting insights regarding the possibility to apply theoretically grounded CSFs to different type of contexts. Our result shows that not all CSFs apply to our sample of IT projects, which is similar to the conclusion

of Scott-Young and Samson (2008). This further lends weight to the view that all projects are unique and the difficulties with finding general CSFs across different contexts.

We also found that it is important to separate different project management success criteria, when investigating links between CSFs and success criteria. This again supports the findings of Scott-Young and Samson (2008). Further research in the area of CSFs should distinguish between different project management success criteria.

6.2 Contribution to practitioners

Our study also has practical implications for project practitioners, project managers, project portfolio managers, as well as senior management. We identify that adherence to project schedule and budget can be achieved through effective management. There are project schedule and budget performance improvements to be made from ensuring management support and addressing risk through out the project. Additionally budget performance gains can be achieved from also continuously monitoring and controlling project progress.

6.3 Contribution to sustainable development

The results presented in this study can guide organizations to more effective utilization of resources. By focusing on the factors with highest impact on project management outcome a more sustainable economic development can be achieved. This would also decrease the ecological impact through better utilization of resources. Furthermore, social sustainability in project practitioners' work environment can be improved through reducing social stress caused by missed deadlines and budgets.

6.4 Future research

In this research we did not consider the project life-cycle. As project are unique and of temporary nature, research on CSFs should account for the project phase. It is possible that different CSFs are more or less important in different project phases. In this study no differentiation on project phase was done, thus we are not able to uncover any differences arising from project phase. Hence, we believe that future research on CSFs for project management success should account for the project phase.

One strength with this study was that through in-depth collaboration we were able to gain a deeper understanding of how project management is conducted and how

project management success is achieved for IT project in a multinational logistics company, where IT is not the core product of the company. However, for identifying CSFs for project management success the sample in our study was limited. Further research should rely on larger samples that would increase the reliability of eventual findings.

This study shines further light on the possibility that project with different characteristics experience different CSFs for project management success. Further research should continue to enrich theory through empirical studies of projects in their context.

References

Baccarini, David (1999). "The Logical Framework Method for Defining Project Success". In: *Project Management Journal* 30.4, pp. 25–32.

Bakker, Karel de, Boonstra, Albert, and Wortmann, Hans (2010). "Does risk management contribute to IT project success? A meta-analysis of empirical evidence". In: *International Journal of Project Management* 28, pp. 493–503.

Barclay, Corlane and Osei-Bryson, Kweku Muata (2010). "Project performance development framework: An approach for developing performance criteria & measures for information systems (IS) projects". In: *International Journal of Production Economics* 124, pp. 272–292.

Beamon, Benita M (1999). "Measuring Supply Chain Performance". In: *Industrial Engineering*.

Belassi, Walid and Tukel, Oya Icmeli (1996). "A new framework for determining critical success/failure factors in projects". In: *International Journal of Project Management* 14.3, pp. 141–151.

Bryman, A. (2006). "Integrating quantitative and qualitative research: how is it done?" In: *Qualitative Research* 6.1, pp. 97–113.

Campion, Michael A., Medsker, Gina J., and Higgs, A. Catherine (1993). "Relations between work group characteristics and effectiveness: Implications for designing effective work groups". In: *Personnel Psychology* 46.4, pp. 823–850.

Carvalho, Marly Monteiro de, Patah, Leandro Alves, and de Souza Bido, Diógenes (2015). "Project management and its effects on project success: Cross-country and cross-industry comparisons". In: *International Journal of Project Management* 33, pp. 1509–1522.

Chan, Albert P C, Ho, Danny C K, and Tam, C M (2001). "Design and Build Project Success Factors: Multivariate Analysis". In: *Journal of Construction Engineering and Management* 127.2, pp. 93–100.

Chow, Tsun and Cao, Dac-Buu (2008). "A survey study of critical success factors in agile software projects". In: *The Journal of Systems and Software* 81, pp. 961–971.

Chua, D K H, Kog, Y C, and Loh, P K (1999). "Critical Success Factors for Different Project Objectives". In: *Journal of Construction Engineering and Management* 125.3, pp. 142–150.

Clarke, Angela (1999). "A practical use of key success factors to improve the effectiveness of project management". In: *International Journal of Project Management* 17.3, pp. 139–145.

Cooke-Davies, Terry (2002). “The "real" success factors on projects”. In: *International Journal of Project Management* 20, pp. 185–190.

Delacre, Marie, Lakens, Daniël, and Leys, Christophe (2017). “Why Psychologists Should by Default Use Welch’s t-test Instead of Student’s t-test”. In: *International Review of Social Psychology* 30.1, pp. 92–101.

Easterby-Smith, Mark, Thrope, Richard, and Jackson, Paul (2015). *Management & Business Research*. SAGE Publication.

Fortune, Joyce and White, Diana (2006). “Framing of project critical success factors by a systems model”. In: *International Journal of Project Management* 24, pp. 53–65.

Frels, Rebecca K. and Onwuegbuzie, Anthony J. (2013). “Administering quantitative instruments with qualitative interviews: A mixed research approach”. In: *Journal of Counseling and Development* 91.2, pp. 184–194.

Gad, Khaled M et al. (2004). “Design of an Effective Manufacturing Performance Measurement System”. In: *IEE Annual Conference*.

Globerson, Shlomo (1985). “Issues in developing a performance criteria system for an organization Issues in developing a performance criteria system for an organization”. In: *International Journal of Production Research* 23.4, pp. 639–646.

Hair, Joseph F. et al. (2014). *Multivariate data analysis*. Harlow, Essex: Prentice Hall.

Hoegl, Martin et al. (2001). “Teamwork Quality and the Success of Innovative Projects : A Theoretical Concept and Empirical Evidence”. In: *Organization Science* 12.4, pp. 435–449.

Hudson, Mel, Smart, Andi, and Bourne, Mike (2001). “Theory and practice in SME performance measurement systems”. In: *International Journal of Operations & Production Management* 21.8, pp. 1096–1115.

Iyer, K. C. and Jha, K. N. (2005). “Factors affecting cost performance: Evidence from Indian construction projects”. In: *International Journal of Project Management* 23, pp. 283–295.

Johnson, R. Burke and Onwuegbuzie, Anthony J. (2004). “Mixed methods research: A research paradigm whose time has come”. In: *Educational Researcher* 33.7, pp. 14–26.

Lavagnon, Ika (2009). “Project Success as a Topic in Project Management Journals”. In: *Project Management Journal* 40.4, pp. 6–19.

Marques, Guillaume, Gourc, Didier, and Lauras, Matthieu (2010). “Multi-criteria performance analysis for decision making in project management”. In: *International Journal of Project Management* 29, pp. 1057–1069.

McLeod, Laurie, Doolin, Bill, and MacDonell, Stephen G. (2012). “A perspective-based understanding of project success”. In: *Project Management Journal* 43.5, pp. 68–86.

Mir, Farzana Asad and Pinnington, Ashly H. (2014). “Exploring the value of project management: Linking Project Management Performance and Project Success”. In: *International Journal of Project Management* 32, pp. 202–217.

Müller, Ralf and Jugdev, Kam (2012). “Critical success factors in projects: Pinto, Slevin, and Prescott – the elucidation of project success”. In: *International Journal of Managing Projects in Business* 5.4, pp. 757–775.

Müller, Ralf and Turner, Rodney (2007). "The Influence of Project Managers on Project Success Criteria and Project Success by Type of Project". In: *European Management Journal* 25.4, pp. 298–309.

Neely, Andy, Gregory, Mike, and Platts, Ken (1995). "Performance measurement system design: A literature review and research agenda". In: *International Journal of Operations & Production Management* 15.4, pp. 80–116.

Nunally, Jum C. (1967). *Psychometric Theory*. New York: McGraw Hill. Cited in Chow, T., & Cao, D.-B. (2008). A survey study of critical success factors in agile software projects. The Journal of Systems and Software, 81, 961–971.

Papke-Shields, Karen E., Beise, Catherine, and Quan, Jing (2010). "Do project managers practice what they preach, and does it matter to project success?" In: *International Journal of Project Management* 28, pp. 650–662.

Patanakul, Peerasit, Iewwongcharoen, Boonkiart, and Milosevic, Dragan (2010). "An empirical study on the use of project management tools and techniques across project life-cycle and their impact on project success". In: *Journal of General Management* 35.3, pp. 41–65.

Pinto, Jeffrey K (2013). *Project management: Achieving competitive advantage*. 3rd ed. Boston: Pearson.

Pinto, Jeffrey K and Mantel, Samuel J (1990). "The Causes of Project Failure". In: *IEEE Transactions on Engineering Management* 37.4, pp. 269–276.

Pinto, Jeffrey K and Slevin, Dennis P (1987). "Critical Factors in Successful Project Implementation". In: *IEEE Transactions on Engineering Management* 34.1.

Pinto, Jeffrey K and Slevin, Dennis P (1988). "Critical success factors across the project life cycle". In: *Project Management Journal* 19.3, pp. 67–75.

Rubin, Irwin M and Seelig, Wyckham (1967). "Experience as a Factor in the Selection and Performance of Project Managers". In: *IEEE Transactions on Engineering Management* 14.3, pp. 131–135.

Ruxton, Graeme D. (2006). "The unequal variance t-test is an underused alternative to Student's t-test and the Mann-Whitney U test". In: *Behavioral Ecology* 17.4, pp. 688–690.

SAS Institute (2017). *Principal Component Analysis*. URL: `http://support.sas.com/publishing/pubcat/chaps/55129.pdf` (visited on Apr. 26, 2017).

Schenker AB (2017). *About DB Schenker in Sweden*. URL: `http://www.dbschenker.se/log-se-se/om_foretaget/om_db_schenker_sverige/omforetaget.html` (visited on Mar. 28, 2017).

Scott-Young, Christina and Samson, Danny (2008). "Project success and project team management: Evidence from capital projects in the process industries". In: *Journal of Operations Management* 26, pp. 749–766.

Shenhar, Aaron J et al. (2002). "Refining the search for project success factors : a multivariate, typological approach". In: *R&D Management* 32.2, pp. 111–126.

Simons, Robert (1991). "Strategic Orientation and Top Management Attention to Control Systems". In: *Strategic Management Journal* 12.1, pp. 49–62.

Slevin, Dennis P and Pinto, Jeffrey K (1986). "The Project Implementation Profile: New Tool For Project Managers". In: *Project Management Journal* 17.4, pp. 57–70.

Thomas, Graeme and Fernández, Walter (2008). "Success in IT projects: A matter of definition?" In: *International Journal of Project Management* 26, pp. 733–742.

Todorović, Marija Lj et al. (2015). "Project success analysis framework: A knowledge-based approach in project management". In: *International Journal of Project Management* 33, pp. 772–783.

Westerveld, E. (2003). "The Project Excellence Model: Linking success criteria and critical success factors". In: *International Journal of Project Management* 21, pp. 411–418.

Whittaker, Brenda (1999). "What went wrong? Unsuccessful information technology projects". In: *Information Management & Computer Security* 7.1, pp. 23–29.

Winter, Mark et al. (2006). "Directions for future research in project management: The main findings of a UK government-funded research network". In: *International Journal of Project Management* 24, pp. 638–649.

Wit, Anton de (1988). "Measurement of project success". In: *International Journal of Project Management* 6.3.

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Appendix 1

PROJECT MANAGEMENT SURVEY

Survey number:

Project:

Background questions			
Role in this project:	Project Manager ☐	Project member ☐	Other ☐
Consultant:	Yes ☐	No ☐	
Sex:	Male ☐	Female ☐	
Age:			
Team size in this project:			
Type of project:			
Total budget:			
Total duration:			

Project managers experience
Years of total project management experience:
Number of previous projects managed:
Years of service with Schenker AB:

Support from senior management	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Upper management understands the amount of resources (money, time, manpower, equipment, etc.) required to implement this project	☐	☐	☐	☐	☐
Upper management has granted me the necessary authority and will support my decisions concerning the project	☐	☐	☐	☐	☐
Upper management shares the responsibility for ensuring project success	☐	☐	☐	☐	☐

Clear objectives	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The basic goals of the project are clear to me	☐	☐	☐	☐	☐
I am aware of and can identify the beneficial consequences to the organization of the successful project	☐	☐	☐	☐	☐
The project goals have been explained to all personnel affected by the project	☐	☐	☐	☐	☐

Project planning	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I have a detailed plan (including time schedules, milestones, manpower requirements, equipment requirements, etc.) for completion of the project	☐	☐	☐	☐	☐
There is a detailed budget for the project	☐	☐	☐	☐	☐
Key personnel needs (who, when) are specified in the project plan	☐	☐	☐	☐	☐

Specification	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The development of a work breakdown structure (WBS) resulted in concrete tasks	☐	☐	☐	☐	☐
The content and specification of each task are clear to me	☐	☐	☐	☐	☐
Each task is described at an appropriate level of abstraction	☐	☐	☐	☐	☐

Communication/feedback	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The reasons for any changes to existing policies/procedures have been explained to members of the project team, other groups affected by changes, upper management	☐	☐	☐	☐	☐
Input concerning project goals and strategy has been sought from members of the project team, other groups affected by the project, and upper management	☐	☐	☐	☐	☐
There exist well-defined channels for feedback from clients, upper management, members of other groups, and project team members	☐	☐	☐	☐	☐

User/client involvement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I understand the needs of those who will use the project	☐	☐	☐	☐	☐
I have discussed the value of the project with the eventual clients	☐	☐	☐	☐	☐
I have solicited input from all potential clients of the project	☐	☐	☐	☐	☐

Risk management	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I have addressed "problem areas" by discussing them with appropriate personnel and identifying a solution strategy	☐	☐	☐	☐	☐
I take immediate action when problems come to my attention	☐	☐	☐	☐	☐
In case of project difficulties, I know exactly where to go for assistance	☐	☐	☐	☐	☐

Monitoring/control	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I regularly compare actual progress against the project schedule	☐	☐	☐	☐	☐
I am monitoring all important aspects of the project, including measures that will provide a complete picture of the project's progress (adherence to budget, manpower and equipment utilization, adherence to schedule, market position, project team image, project team morale, client and public relations, personnel, training and development, innovation and research, information systems)	☐	☐	☐	☐	☐
All members of the project team are kept informed of the status of the project	☐	☐	☐	☐	☐

Project outcome	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The project consistently delivered on time	☐	☐	☐	☐	☐
The project consistently delivered on budget	☐	☐	☐	☐	☐

Additional Comments: