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IN DIFFERENT ORGANIZATIONAL CONDITIONS

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ABSTRACT

This thesis studies the most significant critical success factors in effective project management in different organizational conditions. Companies are increasingly using projects in their daily work to achieve company goals. In recent years researchers have become increasingly interested in factors that may have an impact on project management effectiveness and the success of projects. However, there is little research that shows how effectively projects are managed in a business organizational context. This study aims to partly fill this gap by presenting results from a case study and surveys of business organizations practicing project management.

The purpose of the first article – the management of two investment projects and changes in project management over a 10-year period – is to investigate and analyze the status and significance of investment management systems in the implementation of partnership investment projects. The case study focused on two air gas plant projects, OKSO and NiCu, conducted as partnership projects by Oy Aga Ab and Outokumpu Oy/Outkokumpu Harjavalta Metals Oy. The projects were carried out over a 10-year period. Project analysis showed that factors in the OKSO and NiCu projects corresponded with factors in the study's framework, identified through recent study. According to project success estimates, these projects avoided certain conventional failures. On the basis of empirical observations, it can be said that it is important that project managers have a firm grasp of project management and especially of contracts and contract technique. Experience, especially in the management of change, was perceived to be a significant factor in project success. In managing projects, it is important to know how to handle both the tools and the people and to achieve a balance between the two. Matters pertaining to the partnership projects were agreed beforehand and in writing. An arbitrator to handle cases of dispute was also assigned in advance. In the future, more attention should be given to resource planning, the earned value method, communication networks and the making of contracts. The results gained show the perspective and initial importance ranking of different skills and knowledge areas of project management.

The second article examines project management effectiveness in project-oriented business organizations. The aim of the study is to investigate the effectiveness of project management in terms of organizational structures, technical competency, leadership ability and the characteristics of an effective project manager. The subjects of this survey were modern project-oriented business companies. The results indicate that organizational design is associated with project management effectiveness. For example, they indicate that project matrix and project team-based organizations are the most effective. Moreover, respondents are reasonably satisfied with the currently available selection of project management tools, yet the need was stated for a multi-project management tool. The characteristics of an effective project manager were measured by means of leadership behavior in 14 managerial practices. The results suggest that planning/organizing, networking and informing are the most significant managerial practices in the leadership behavior of project managers. This study provides empirical evidence of project management effectiveness with the intent of contributing to a better understanding and improvement of project management practices.

The third article documents the success of projects in different organizational conditions. The main purpose of this study is to evaluate the critical success/failure factors in project management and to examine the relationships between critical success factors and organizational background variables. This study also aims to gain an understanding of how project clients, owners and sponsors present their needs and expectations to ensure project success. On the basis of the survey responses received, it is possible to identify critical success factors in project management that are significantly related to company/organization size, project size, organization type and project managers' work experience. The project implementation profile is also analyzed on average and by phases. The results indicate the importance of project communication that is related to company size, however. In contrast to some prior studies, communication was ranked the highest in most project phases.

Keywords: project management, project analysis, project success, planning modes.

JEL classification: O21, O22, M49, M54.

LIST OF ARTICLES

Hyväri, Irja. 2002. Management of Partnership Projects: The Management of Two Investment Projects and Changes in Project Management over a 10-Year Period - A Case Study. In *Proceedings of PMI Research Conference "Frontiers of Project Management Research and Applications",* 14-17 July.2002, Seattle, Washington USA. Conference Co-Chairs: Dennis P. Slevin, Jeffrey K. Pinto, and David I. Cleland. Pages 267-277.

Hyväri, Irja. 2006. Project management effectiveness in project-oriented business organizations. *International Journal of Project Management* Vol 24, No. 3. Pages 216-225.

Hyväri, Irja. 2006. Success of Projects in Different Organizational Conditions. *Project Management Journal,* The Professional Research Journal of the Project Management Institute. Vol 37, No 4. Pages 31-42.

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LIST OF KEY TERMS

Project

Projects are performed by people, constrained by limited resources, and planned, executed, and controlled. A project is a temporary endeavor undertaken to create a unique product or service. Temporary means that every project has a definite beginning and a definite ending. Unique means that the product or service is different in some distinguishing way from all similar products or services. Projects are often critical components of the performing organizations´ business strategy. (PMBOK 1996, Wideman 2002).

Project management

Project management is the application of knowledge, skills, tools, and techniques to project activities in order to meet or exceed stakeholder needs and expectations from a project. Meeting or exceeding stakeholder needs and expectations invariably involves balancing competing demands among:
- Scope, time, cost, and quality.
- Stakeholders with differing needs and expectations.
- Identified requirements (needs) and unidentified requirements (expectations). (PMBOK 1996, Wideman 2002).

Project management effectiveness

Project management effectiveness is a measure of the quality of attainment in meeting objectives. It is the extent to which the goals of a project are attained, or the degree to which a system can be expected to achieve a set of specific requirements. (Wideman 2002).

Success factors/ Critical success factors

Critical factors are factors that will ensure achievement of success criteria. While critical success factors are essential for completing the project success, other success factors are also needed, but they have merely a contributing role. Success criteria are criteria to be used for judging if the project is successful. Project success criteria are the criteria upon which the relative success or failure of the project may be judged. Three basic sets of criteria can be identified:
1. From the sponsoring organization, owner or user.
2. The traditional or classical project management one of on time, in budget or to specification.
3. Project profitability.

It is important to note that criteria change with time. The fact that the original objectives were not achieved does not necessarily mean the project was a failure. (Wideman 2002).

Successful project

A project is successful when:
   1. The objectives of the project have been achieved to the full satisfaction of the users
   2. all closeout activities have been completed, and
   3. all designated interest, including the project's sponsor and/or initiator officially accepts the project results or products and closes the project. (Wideman 2002).

Project management system

A project management system includes process, organization, and techniques, tools and methods. Project phases build a process. Project phases include: definition, planning and organizing, implementation and control, and closeout.

Organizational conditions

Organizational conditions include the general background and the context where project management is carried out. It includes factors such as the organizational form, size, and industry of the organization as well as some more specific context factors such as project size, type, and the number and experience of the people involved in the project.

PART I: OVERVIEW OF THE DISSERTATION

1. INTRODUCTION

This dissertation is about project management, the roots of which go back to investment project management methods developed from the Gantt chart during the First World War. Since then, project management has developed through the critical path method (CPM) and program evaluation and review technique (PERT), to the whole project management process. In the 1980s, the use of automatic data processing (ADP) for project management was emphasized. The problems of project management techniques were further analyzed in the 1990s, and some new techniques were presented. Information systems along with ready-made project control systems have been developed and the investment follow up, after closeout and project pre-studies influencing better investment implementation have been emphasized (Kähkönen 1996). There have also been calls for research on how project management acts in practice (Engwall 1995).

Concurrent to these developments, the importance of the project group and team (Williams 1997, Katzenbach & Smith 1993), empowerment and organizational learning (Argyris 1977, 1990, Hammuda & Dulaimi 1997, Ayas 1996, Senge 1990), as well as communication in project management have been recognized. Regarding risk management, the focus has turned from quantitative methods to the development and organizing of the risk management process in different project phases (Chapman & Ward 1997, Artto 1997, Kähkönen 1997). As a response to the needs of project managers, A Guide to the Project Management Body of Knowledge (PMBOK®

Guide) has been created, and a certification process for project managers has been launched.

Although cooperation and networks between companies have increased lately, research in this area is still rare (Hedberg & al. 1997, Guss 1997, Weston & Gibson 1993, Larson 1995, Cook & Hancher 1990, Bartha-Johnson 1997). In prior studies, in the area of project management research, the project manager's leadership principles and duties were examined. It was concluded that organizational effectiveness requires project management to combine technical competency, i.e. tools, with the ability to develop and display leadership. The leadership factors in the success of projects, the factors contributing to making project management effective, and the characteristics of effective project managers were examined by Zimmerer and Yasin (1998), Kim and Yukl (1995), Yukl (2002) and Hyväri (2000, 2002). Project evaluation and improvement and strategic alignment are both increasing their significance for project management, according to an article analysis over the last 10 years (Crawford & al. 2006). Jugrev and Muller (2005) concluded, in their study of the evolving understanding of project success over the past 40 years, that the understanding of project success is also important because it has a bearing on the future directions of project management in the strategic context.

The current knowledge is inadequate in relation to understanding the factors enabling the success of projects in different organizational conditions. Companies increasingly use projects in their daily work to achieve company goals. There is a growing need for competent project management in various business organizations. In recent years researchers have become increasingly interested in factors that may have an impact on

project management effectiveness and the success of projects (Jugrev & Muller 2005, Crawford & al. 2006). However, there is little research that shows how effectively projects are managed in a business organizational context. This study aims to partly fill this gap by presenting the results from a case study and surveys made of business organizations.

The main research question in this study is: What factors, if any, contribute to successful project management?

In order to provide an answer to this question, the purpose of this study is to recognize the most significant critical success factors in effective project management in different organizational conditions. The thesis will be conducted in three separate articles. The purpose of the first article is to investigate and analyze the state and significance of investment project management systems in the implementation of partnership investment projects. This study is the basis for further research of project management effectiveness and success/failure factors. The second article investigates the effectiveness of project management in terms of organizational structures, technical competency, leadership ability and the characteristics of an effective project manager. Finally, the third article evaluates the critical success/failure factors in project management and examines the relationships between critical success factors and organizational background variables.

The overall methodology of this study is based on different approaches comprising both case studies (the first article) as well as surveys (the second and third article).

This whole research increases the understanding of project management and provides answers to the research question in a new way compared with previous studies. These pointers to future research may well contribute to a better understanding and an improvement of project management practices in the project management context.

In the next section, the project management literature and research – which illustrate how this study is related to previous literature/research – are briefly reviewed. The literature is presented using five themes: 1) organizational structures, 2) technical competency, 3) leadership ability, 4) the characteristics of effective project managers, and 5) critical success factors in project management.

After this, the original papers are summarized. The summaries consist of research objectives, research methods and data, results and conclusions.

In Part II, the original articles are presented.

2. RELATED PRIOR LITERATURE/RESEARCH

Lately, researchers have become increasingly interested in project management effectiveness and the factors that affect it. The research addressing project management effectiveness and the success of projects in different business organizational conditions includes the following themes 1) organizational structures, 2) technical competency, i.e. tools, and methods in project management, 3) leadership ability, 4) the characteristics of effective project managers, 5) critical success factors in project management. The following review of previous research concerning these aspects points to the state of current knowledge and missing knowledge concerning

project management effectiveness and the success of projects in different organizational conditions.

Organizational structures

Organizational structures exhibit great diversity, ranging from classic, purely functional organizations to projectized organizations (PMBOK). As defined by Gobeli and Larson (1987), matrix organizations take the form of functional, balanced and project matrices, whereas PMBOK assigns matrix types to weak, balanced and strong matrices. Most modern organizations contain a mixture of all of these structures at various levels. In a fundamentally functional organization, for example, a special project team can be established to handle a critical project, and a project managers' interaction with upper-level management can be more intense than with functional managers (Kerzner 1990). The use of different types of organizations, according to Gobeli and Larson (1987), involves functional matrices, project matrices and project teams. Chuad et al. (1995) examined the use of different types of project management structure in 84 case studies. They found the matrix structure was used in 68 % of cases. Turner et al. (1998) examined a USA government research and development center and found that the project matrix was selected in 64 % of cases, the functional matrix in 23 % of cases and the balanced matrix in 13 % of cases. Most organizations in a multi-project context are matrix organizations (Payne 1995). The project management environment in a multi-project context and in (semi-) project-driven organizations was noticed to be an area where project management theory does not provide sufficient support for the management of projects (Payne 1995, de Boer 1998). The matrix form was seen to be the most dominant (Chuad & al. 1995), and

the research concluded with a note that further research is needed on the human and social issues.

Technical competency

In this study, project management effectiveness is identified in technical competency, i.e. the tools and methods used in project management. As indicated by a survey of PMI (Project Management Institute) members, project management software is commonly used by project management professionals in the USA (Pollack-Johnson and Liberatore 1998). While there are a large number of project management tools on the market, most project managers use, however, only a small subset of these tools, such as Microsoft Project (Fox & Spence 1998). In general, project managers seem to be satisfied with the tools available, even if they are not using them to their intended capacity. Yet, the need was stated for a multi-project management tool (de Boer 1998, Payne 1995). The literature (Zwikael & al. 2000) offers several methods for forecasting the final project cost. Earned value (Fleming & Koppelman 1994, 1996, Brandon 1998) is a quantitative approach to evaluating the true performance of a project in terms of both cost deviation and schedule deviation. However, the effective use of this important technique is relatively rare outside the U.S government and its contractors. Earned value is one of the underused cost management tools available to project managers.

Leadership ability

When the respondents in the previous study of Zimmerer and Yasin (1998) were asked about the factors contributing to an effective project manager, it transpired that positive leadership accounted for almost 76 % of project success. The most important

factors according to Zimmerer and Yasin (1998) were leadership by example, being visionary, and being technically competent. In the study of Hohn (1998), the question "What are the conditions in the start-up phase for success in an innovative team" was answered by the leaders (including project managers) from their own experience as follows: 1) motivation, 2) group dynamics, 3) clear goals, 4) selection (people). The overall evidence of recent research supports the view that successful projects are led by individuals who possess not only a blend of technical and management capabilities, but also leadership skills that are internally compatible with the motivation of the project team and externally compatible with client focus strategies. (See, e.g., Hetzberg & al. 1967, Turner & al. 1998, and Slevin and Pinto 1988.) In addition, Posner 1986, as well as Thanhaim and Wilemon 1977, 1975 have studied conflict management styles and issues that cause conflict.

Leadership can be defined in many ways (Yukl 2002, Ropo 1989, Dansereau & al. 1995, Yammarino & Bass 1990, Yammarino & al. 1993). The most commonly used measure of leadership effectiveness is the extent to which the leader's organizational unit performs its task successfully and attains its goals. Yukl (1994) states that in most leadership definitions it is assumed that leadership involves a social influence process whereby intentional influence is exerted by one person over other people in an attempt to structure the activities and relationships in groups or organizations. Project management literature is mostly based on team literature. The knowledge developed by social science in the 1960s and 1970s on the dynamics of small groups is rarely used, if at all (Hohn 1999).

The characteristics of effective project managers

Leadership behaviors are sometimes measured by a questionnaire called the Managerial Practices Survey (MPS) (Yukl 2002, Kim & Yukl 1995, Yukl & al. 1990). The taxonomy has fourteen behavior categories, or "managerial practices", with Yukl (2002) providing a definition for each one. MPS measures categories of managerial behavior that are relevant to managerial effectiveness and applicable to all types of managers. The fourteen behaviors can also be related to the four general types of activities (Yukl 1994) – making decisions, influencing people, building relationships and giving-seeking information. Kim and Yukl (1995) have studied the relationships of managerial effectiveness and advancement to self-reported and subordinate-reported leadership. They have also presented a rating scale by using nine-response choices. In this study the characteristics of an effective project manager were measured by the Managerial Practices Survey (MPS) method.

Critical success factors in project management

The concept of project success has not been well-defined in project management literature (Munns & Bjeirmi 1996, Baccarini 1999, Wideman 2002). Failure is also an imprecise and ill-defined term used by practitioners and in the literature, without deep meaning (Rae & Eden 2002). Shenhar and Wideman (2000) conclude that there does not appear to be any agreed understanding of the concept of success in either business or project management literature. Cooke-Davies (2002) also notes that decades of individual and collective efforts by project management researchers since the 1960s have not led to the discovery of a definitive set of factors leading to project success.

On the basis of previous research in project management, the critical success/failure factors in project phases and conflict situations have been reviewed (Pinto & Slevin 1987, Pinto & Prescott 1988, Adams & Barnt 1978, Cleland & King 1983, Belassi & Tukel 1996, Schultz, Slevin, & Pinto 1987, Honko, Prihti, & Virtanen 1982). A survey of critical success/failure factors has also been carried out by dividing the factors into strategy and tactics. A few success/failure factors in the project process have been observed.

The success factors are usually expressed as either very general factors or very specific factors affecting only a particular project (Cleland & King 1983, Baker & al. 1983, Pinto & Slevin 1987, Finch 2003). The Project Implementation Profile (PIP) was developed by Slevin and Pinto (1986, 1987) in an attempt to identify which aspects of a project determine success or failure. Its aim is to assist in identifying and measuring 10 critical success factors (CSFs) for a successful project outcome. This PIP was applied by Pinto (1990), Pinto and Prescott (1988), Dilisle and Thomas (2002), and recently Finch (2003), who applied PIP to an information systems project. Pinto and Prescott (1988) examined critical success factors over the project life cycle. They found that the relative importance of several of the critical factors changes significantly based on the life cycle stages.

There is little research on dependencies between organizational context and critical success factors in project management. Fortune and White (2006) presented critical success factors mapped onto components of the formal system model. They used this model's features to make comparisons between this model and two projects. Belassi and Tukel (1996) found in their literature review that, although most authors tabulated

individual success factors, they did not group or classify them. Belassi and Tukel (1996) emphasize, in their summary of previous research, the importance of understanding the critical success/failure factors and how to measure them and the interactions between these factors. They grouped the critical success factors into five categories (project, project manager, project team, organization, and external environment). The research review above reveals that there is a gap in research concerning the success of projects in an organizational context. Conflict management has been found to be a prerequisite for effective project management (Blake & Mouton 1964, Burke 1969, Barker & al. 1988, Thamhain & Wilemon 1975). Conflict management has been noted to require (in order): collaboration, compromise, accommodation, dominance, avoidance (Posner 1986).

There are still a great many examples of projects exceeding their budgets, running late or failing to meet other objectives (Frimpong & al. 2003). Numerous methods and techniques have been developed, and many examples exist of project management tools used for tracking the harder technical aspects of projects. However, there have been few attempts to combine a tool to aid project tracking and control in relation to the softer human elements of project management (Pinto 1990). However, additional future research concentrating on the relationship between critical success factors and measurement techniques and human elements in project management can be expected. It would seem to be of interest to give increased research attention to the behavior and organizational factors of project management (Zimmerer & Yasin 1998, Hyväri 2000, 2002).

In conclusion, the review of previous literature suggest, there is not enough knowledge of how projects are managed in organizations where projects are used to achieve other goals. There are a few studies of project management in business organizations and only a few studies of the effectiveness of project management in these kind of organizations. There is an evident need to analyze organizational arrangements, technical competency such as project management tools and methods, leadership ability and the characteristics of an effective project manager. The research review above also reveals that there is a gap in research of the success of projects in an organizational context. There is not enough knowledge about the dependencies between organizational context and critical success factors in project management. There is also an evident need to understand priorities of different success factors in different project phases.

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3. SUMMARIES OF THE ARTICLES

3.1 MANAGEMENT OF PARTNERSHIP PROJECTS: THE MANAGEMENT OF TWO INVESTMENT PROJECTS AND CHANGES IN PROJECT MANAGEMENT OVER A 10-YEAR PERIOD. A CASE STUDY.

Research objectives

As noted in the literature review, although many studies of project management have been carried out, many investment projects still fail. Theoretical analysis has shown that there has been very little research on the whole project management system process, and even less research on partnership investment project management systems. Empirical studies, too, are rare. Empirical studies have pointed out that much more attention should be given to the whole investment process, i.e. from the definition to the close-out. There are very few studies on the investment implementation phase. However, in that phase there seem to be numerous problems. In project management behavior studies, therefore, more attention should be paid to the implementation phase and problems in it. Research was expected on how project management acts in practice. There are only a few studies of human resource management. Lately, cooperation and networks between companies have increased. However, research in this area is still rare. More investigation is needed for it to be possible to estimate the value of the partnership concept. On the basis of previous research in project management, critical success/failure factors in project phases and conflict situations have been reviewed. Conflict management has been noted to be a prerequisite for effective project management.

The purpose of this study is to investigate and analyze the state and significance of investment project management systems in the implementation of partnership investment projects. Therefore the study

- explores the theoretical framework of investment project management on the basis of previous research

- describes two partnership investment project management systems

- analyzes empirical results using the theoretical framework

-examines differences between two empirical investment projects

-investigates observations connected to project success

Finally, a summary of the main results of success factors and threats in managing investment projects is presented.

Research method and data

The investment process has been the basis of the investment management process framework (the framework is founded on a Licentiate thesis, Hyväri, 2000). The investment project management phases were specified on the basis of the previous research: definition, planning and organizing, implementation and control, and close-out. The phases build a process. In the empirical part of this study, two investment project management process and system factors were formed and described, and these were analyzed using the theoretical framework. The aim of the study is to increase the understanding of the special features in the implementation of partnership projects, and the possible differences in the project management process over a 10-year period.

The case study (Ferreira & Merchant 1992, Yin 1989, Scapens 1990) was chosen for the reason that, to understand the investment project management process and system

features, one needs depth and an intensive research method. The case study method is generally considered to fit the research of complicated phenomena in their practical settings. This case research can be mainly classified as descriptive, exploratory research. The objective of research is to provide information concerning the nature and form of existing practices (Scapens 1990, Ryan & al.1992). To assess the validity and reliability of the research, evidence was collected from multiple sources (triangulation) (McKinnon 1988, Ryan & al. 1992, Ferreira & Merchant 1992). Observation and participant-observation (Yin 1989) were essential to this study.

The case study focused on Oy AGA Ab, a gas company. AGA is the biggest and the most remarkable producer of industry and medical gases in Finland. For the empirical part of this study, two partnership projects were chosen. These project implementations required their own project organization and fulfilled the characteristics of large projects. These projects, two AGA air gas plant projects – the OKSO and NiCu management systems – will be described. The OKSO project was built by AGA during the years 1983-1984 as an on-site plant connected to the Outokumpu Oy Harjavalta plant. The NiCu project was built during the years 1993-1995 by AGA in connection with the Outokumpu Harjavalta Metals Oy Harjavalta plants. Outokumpu Oy is an important customer of AGA.

The first investment was implemented during the years 1982-1984. The research material for the OKSO case study consists of interviews, participant observations and written documents. In addition, the researcher actually participated in the implementation of this project. The researcher worked in the company studied during the years 1980-1986. In the second NiCu investment project, implemented during the

years 1993-1995, the researcher interviewed the project personnel. The written material consisted of annual reports and articles about these projects. In addition, internal project guidelines such as the project administration handbook, the investment guidelines handbook, the project descriptions (project plans), and other project material of the implementation phase were available.

Results

It seemed in the empirical analysis, just as in the framework, that the basic system in project management stays unchanged, but it is controlled and changed to respond to each project separately. According to empirical observations, project managers should have a good knowledge of project management and especially of contracts and contract techniques. The experience of project personnel and project managers was perceived to have great significance for project success, especially in change management. In managing projects, it is important to know how to handle both the tools and the people and to keep a balance between these. Concerning the project management organization, it was stated that an organization chart and job descriptions had been completed and communicated. Responsibility and power questions and the way to handle crises and organization were decided and made clear to all participants. The project people had the opportunity to participate in goal setting. In that way, learning in the organization and commitment could be secured. Decision-making in the right place and ongoing communication directly with people, without a middleman, commits and motivates.

The special features of partnership can be noticed in organizations that have started partnership projects for synergy advantages. The facts in these partnership projects were agreed beforehand and in writing. The organization to handle critical facts was

agreed beforehand. Contract negotiations, contracts and goal setting were crucial in the decision to participate in the partnership project.

The success of the OKSO and NiCu projects was influenced by the qualified and experienced project organization. In addition, good conditions prevailed in AGA's environment, and the sales performance was good. The building of plants as partnerships was profitable for both AGA and Outokumpu. Profits came through both investments and reduced production costs. The management of the OKSO and NiCu projects was partly outside the investing company, which caused some problems in co-ordination and responsibility, but this did not have any effect on the project success.

3.2. PROJECT MANAGEMENT EFFECTIVENESS IN PROJECT-ORIENTED BUSINESS ORGANIZATIONS

Research objectives

There is a growing need in business organizations for the management of projects. The use of different types of organization in project management and different ways of organizing project management have been examined. Technical competency, i.e. project management tools, and methods, have been researched. Payne (1995) and de Boer (1998) have studied projects carried out in a multi-project context. Fabi and Pettersen (1992) have studied human resource management (HRM) in project management, producing evidence that HRM practices are little researched. It has been concluded, by Zimmerer and Yasin (1998) and Hyväri (2000, 2002), that organizational effectiveness requires project management to combine technical competency, i.e. tools, with the ability to develop and display leadership. However,

there is little research that shows how technical competency and the process of leadership in project management are combined.

Research in project management, its critical success and failure factors (Belassi & Tukel 1996, Pinto & Prescott 1988, Schultz & al. 1997, Wilemon & Baker 1988), has pointed out the need to research how project management techniques are used, and how these could be used to improve project management quality. In addition, it is only partly known how these tools are used in project management. Previous research has also raised the question of how different kinds of organization are used in project management and how effectively.

This paper presents the results of a survey made in organizations among modern progressive companies. This study investigates the balance between technical competency, i.e. tools, and leadership ability, within the context of organizations which are managing projects to achieve other goals.

Research method and data

In this research the results of previous qualitative, descriptive case studies (Hyväri 2000, 2002) have been utilized to avoid bias and errors attributable to the limitations of the survey. In previous case studies, problems in the management of projects were observed in a profound and intensive way. These studies formed the basis for this further research and the previous studies were utilized to make the survey questions. Besides this survey, three interviews on the basis of the survey questions were made. This study made use of the t-test for equality of means and Spearman's rank

correlation test (Cooper & Schindler 2001, www.wellesley.edu). Data from the survey was imported from Microsoft Excel to the SPSS statistical software for analysis.

The Project Management Association Finland sent an e-mail to 78 company members and 368 personal members asking them to participate in the project management research. 30 responses were received overall and these respondents were asked to participate in a survey. Data were collected via the survey between December 2002 and February 2003. 25 responses were received. All questions were answered. The results were statistically analyzed for correlation and reliability, with the aim of deriving insights into various relevant factors.

In this research the survey started with the question: "Are you interested in learning how projects and their management appear in your organization?" The survey included a great amount of data, fifty-four questions in all, including about 400 subtitles. The number of open questions was fourteen. The survey included questions on the general background of the respondents, projects, and questions on respondents' organization, tools and leadership styles. In addition, the survey included questions on success/failure factors and the ways of handling conflict. People were asked to take part in the survey only if they had been actively involved in managing a project, and were asked to base their responses on their most recently concluded project, even if that project had been curtailed or abandoned. The survey focused on the perspective of the project client/owner/sponsor, and included projects carried out for their own purposes.

Results

The company/organization size in terms of turnover ranged mostly between EUR 31 million and 50 million. Nearly 60 % of the companies/organizations had between 100 and 1000 employees, 8 % had fewer than 10 employees and 4 % had more than 5000 employees. 32 % of respondents identified themselves as top-level, 52 % as mid-level and only 16 % as some other level. During the previous 12 months, 60 % of their work effort on average was project management and they participated on average in 6 projects. The projects were carried out in a multi-project environment. The projects were classified into eight types on the basis of the responses.

In this study the organization types most used by respondents were functional matrix, project matrix, and project team. The least used organizations were functional organization and balanced matrix. The respondents also rated the effectiveness of the different structures in their organization. They felt the project team to be the most effective, and the project matrix to be the second most effective. In this study the respondents indicated the year in which they started to use the project management tool to be between 1969 and 2000, on average in 1985. Project management tools were used in the last 12 months on 75 % of projects, and five years ago on 60 % of projects. Microsoft Project was the most popular tool. The link between the use of project management tools and project management effectiveness was made by asking people's satisfaction with these tools. People were satisfied with these tools in 84 % of cases.

This study aimed, through a survey, to identify leadership ability in project management in business organizations. The survey consisted of questions concerning project management effectiveness in leadership ability. The most critical finding was that five of six characteristics were managerial in nature. In this study, conflicts most likely emerged in the implementation and control phases.

In this study, the characteristics of an effective project manager were measured by a method called the Managerial Practices Survey (MPS) (Yukl 2002, Kim & Yukl 1995, Yukl & al. 1990). The respondents were asked to describe and scale the leadership behavior of the project manager in their latest project. The MPS taxonomy had fourteen behavior categories, or "managerial practices". In this study of these taxonomies, planning/organizing and informing were ranked the highest, and rewarding the lowest. In unsuccessful projects these ratings of "managerial practices" were lower on average. The most remarkable differences between successful and unsuccessful projects were found in the networking and planning/organizing factors.

The overall effectiveness of each project manager in carrying out his or her job responsibilities in most of the projects in this study was well above average, ranking in the top 10 %. In total, 90 % of the projects were in the top 40 %. Only 5 % were seen as moderately below average in the bottom 25 %, while another 5 % were seen as a little below average in the bottom 40 %.

There was a correlation (Spearman's rho) in this study between the leadership behavior of the project manager and the overall effectiveness rankings of the project manager. The correlation was the most significant in the planning/organizing,

networking and conflict management/team building factors, and significant in the monitoring, informing, motivating/inspiring and developing factors.

In analyzing the leadership behavior of the project manager in this study (using the t-test for equality of means), satisfaction with the tools was found to be significant ($p<0.1$) only with the supporting and delegating managerial practices. The planning/organizing, networking and informing managerial practice factors were significant ($p<0.1$) with project success. In the grouped factors, giving-seeking information was significant ($p<0.1$) with project success.

According to this study, it seems that planning/organizing, networking and informing are the most significant managerial practices in the leadership behavior of the project manager. An integrating taxonomy giving-seeking information is the most significant.

3.3 SUCCESS OF PROJECTS IN DIFFERENT ORGANIZATIONAL CONDITIONS

Research objectives

Previous research results indicate that the relative importance of several of the critical factors change significantly based on life cycle stages (Pinto & Prescott 1988). Nevertheless the success factors are usually listed in either very general or very specific terms affecting only a particular project. Knowledge and understanding of the critical success/failure factors, as well as of how to measure them and the interactions between these factors have great importance for project management effectiveness (Belassi & Tukel 1996). However, there have been few attempts to combine a tool to aid project tracking and control in relation to the softer human elements of project

management (Pinto 1990). However, additional future research concentrating on the relationship between critical success factors and measurement techniques and human elements in project management can be expected. It would seem to be of interest to give increased research attention to the behavior and organizational factors of project management (Zimmerer & Yasin 1998, Hyväri 2000, 2002).

This study examines the success factors of project management in organizations actively involved in the project and how the project clients, owners and sponsors in organizations present their needs and expectations to ensure a successful project. The main purpose of this study is to evaluate the critical success/failure factors in project management and to examine their relationships with organizational background variables.

Research method and data

In this research the survey started with the question: "Are you interested in learning how projects and their management appear in your organization?" The survey included a great amount of data, gathered in response to 54 questions, including altogether about 400 subtitles. The number of open questions was 14. The survey included questions on success/failure factors and the ways of handling conflict. In addition, the survey included questions on the general background of the respondents, the projects, and the respondents' organizations, tools and leadership styles. People were asked to take part in the survey only if they had been actively involved in managing a project, and were asked to base their responses on their most recently concluded project, even if that project had been curtailed or abandoned. The survey

focused on the perspective of the project client/owner/sponsor, and included projects carried out for their own purposes.

An e-mail enquiry was sent to 78 company members and 368 individual members, inviting them to participate in the project management survey. A total of 30 responses were received. These respondents were then asked to participate in the actual survey, which was carried out between December 2002 and February 2003. 25 responses were received and all the 54 questions were answered. The results were statistically analyzed for correlation and reliability, with the aim of deriving insights into various relevant factors.

The present survey utilizes the results of previous qualitative, descriptive case studies (Hyväri 2000, 2002) to avoid bias and errors attributable to the limitations of the survey. In addition, three interviews were conducted. The study made use of the Chi-Squared Test Statistic introduced by Karl Pearson (Agresti & Finlay 1997, p. 255). Data from the survey was imported from Microsoft Excel to SPSS statistical software for analysis.

Results

The industry sector breakdown of respondents' organizations is as follows: telecommunications services, software and IT accounted for 32 % of the responses, the manufacturing sector and engineering & construction for 20 % each, public administration & education for 12 %, and others for 16 %.

Most of the companies had an annual turnover of EUR 31-50 million, while 4 companies had a turnover in excess of EUR 150 million. With regard to respondent backgrounds, 32 % of the respondents identified themselves as top-level, 52 % as mid-level and only 16 % as some other level. Most of the respondents were Project Managers with 19 years (on average) of employment and 12 years (on average) as a leader or member of a project team. During the previous 12 months, an average of 60 % of their work effort in their organizations had been in project management (standard deviation 35.5). And they had participated in 6 projects on average (standard deviation 8.3).

The projects were classified into 9 types on the basis of the responses. IT/software and investment projects each accounted for 24 % of respondents, while staff development/training and business change/reorganization projects each accounted for 12 % of respondents. R&D, business reallocation and engineering projects each accounted for 8 % of respondents, and construction projects for 4 % of respondents.

The responses concerning critical success/failure factors were used to identify relationships between these factors and the organizational background variables on projects, organizations and respondents. The three most commonly selected factors in each group were identified for further analysis. There are a total of five groups and 15 factors. The hypotheses were used as a way of determining whether the background organizational variables on projects, and on project type and organization type, was significantly related to success across the most critical success factors. The Pearson Chi-square showed the factors which were significantly ($p<0.1$) related to success.

The relationships were as follows: Company/organization size in terms of turnover had a significant relationship with communication. Communication in project teams was found to be a more significant critical factor in bigger companies/organizations than in smaller ones. A significant relationship was found between project size in terms of millions of euros and adequate funds/resources. In terms of environmental factors, organization type had a relationship with the subcontractor and a weaker relationship with the client. The total work experience of project managers was strongly related to the project factor, "end user commitment". Project managers with longer work experience had a stronger connection with end user commitment. A clear organization/job description was more significant for project respondents whose work experience was fewer than 11 years

The results of this study were also compared with the widely used Project Implementation Profile (PIP) method to find out how the results of this study support the results of PIP. In the ranking used in this study (1 being the most important and 10 being the least important), respondents ranked communication, client consultation and client acceptance as the most important factors, as project managers in the IS project had done in the previous study of Finch (2003).

The critical success factors were also ranked in the different project phases of the project life cycle. The rank correlation analyses carried out in this study showed a strong relationship in factors between the definition, planning and organizing phases.

4. CONCLUSIONS

The purpose of this study was to recognize the most significant critical success/failure factors in effective project management. As described in the previous literature and studies that kind of research is needed.   This whole research increases the understanding of project management and provides answers to the research problem.

The empirical analysis of project management systems in the case study found that the basic system in project management stays unchanged, but is controlled and changed to respond to each project separately. Recently, more attention has been given to the definition and planning phases. According to the empirical observations, project managers should have a good knowledge of project management and especially of contracts and contract techniques. Project personnel and especially project managers´ experience, especially in change management was perceived to have great significance for project success. In managing projects, it is important to know how to handle both the tools and the people, and to keep a balance between these.

The results indicate that organizational design is associated with project management effectiveness. The project matrix and project team-based organizations are the most effective. The respondents in these empirical studies were reasonably satisfied with the currently available selection of project management tools. Yet, the need was stated for a multi-project management tool. When measuring the characteristics of an effective project manager by means of the leadership behaviours of fourteen managerial practices (Kim & Yukl 1995, Yukl & al. 1990, Yukl 2002), the results suggest that planning/organizing. networking and informing are the most significant managerial practices.

The overall finding of the second paper imply that technical managerial tools and methods are so developed and widely used that now it is time to turn the focus on developing leadership skills. The survey respondents in this study ranked the characteristics of an effective project manager as follows: (s)he must be able to communicate and inspire people to become motivated, and in addition (s)he must be decisive enough. These results support the previous results (Hohn 1998) that social science and small group research could be credible for project management.

A strong relationship in this study was seen between the factors in the different project phases of the project life cycle, a strong relationship between the factors in the definition, planning and organizing phases. In ranking the importance of the critical success factors in the Project Implementation Profile (PIP), respondents ranked communication, client consultation and client acceptance as the most important factors in this study.

In relationships between the project critical success factors and the organizational background variables, significant relationships were found between company/organization size and communication. The total work experience of the project managers was strongly related to the end user commitment factor. The organizational type had a relationship with the subcontractor and a weaker relationship with the client. Matrix organizations (functional, balanced and project matrix) and project team organizations were positively related to the subcontractor factor, while the functional organization was negatively related.

The overall contribution of this study is that it indicates some new critical factors for successful project management not documented in related prior literature and suggests how these factors may depend on different organizational conditions. In doing that, this study provides a partial response to the requests put forward in related prior literature on project management.

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PART II: THE ORIGINAL ARTICLES

Frontiers of
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Proceedings of PMI Research Conference 2002

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Management of Partnership Projects: The Management of Two Investment Projects and Changes in Project Management over a 10-Year Period—A Case Study

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Introduction

Theoretical Background of the Study

Businesses and institutions now form joint ventures, strategic alliances, networks, and partnerships faster than ever in what organization theorists call an organization revolution (Bartha-Johnson 1997). However, we know very little of how to form cooperative network processes. Research has produced knowledge of motives, conditions, and structures in networks but little information on how these network processes and procedures are formed. In recent years more attention has been given to partners and a partnership. By partnership generally a long-term partnership of an investor and a supplier is meant; it also includes a partnership development. In that case it is a question of two partners' partnership. However, more investigation is needed for it to be possible to estimate the value of the partnership concept (Cook and Hancher 1990, 445).

Investments can also be implemented as a partnership. Companies' partnerships make special demands on project management. Knowing special features in a partnership project compared to one company's single project helps to obtain synergy advantages. The basis for a successful project management is the knowledge of the project management system. Although many studies of project management have been carried out, many investment projects still fail. Theoretical analysis has showed that there is very little research of the whole project management system process, and even less research of partnership investment project management systems. Empirical studies, too, are rare. In practice project valuation traditionally concentrates on economical and financial matters: classical investment calculations and their analysis. Behavioral investment research tends to focus on investment valuation and choice, i.e., only

a part of the investment process. Empirical studies have pointed out that much more attention should be given to the whole investment process, i.e., from the definition to the closeout. There are very few studies of the investment implementation phase. However, in that phase there seem to be numerous problems. In project management behavior studies, therefore, more attention should be paid to the implementation phase and problems in it (Engwall 1995; Cook and Hancher 1990).

Previous Study

Investment project management methods have developed from the Gantt chart made in the First World War, through the development of critical path method (CPM) and program evaluation and review technique (PERT), to the whole project management process. In the 1980s, the use of ADP for project management was emphasized. In the 1990s, the problems of project management techniques have further been analyzed and, on the basis of these, new techniques have been presented. Information systems have strongly developed along with ready-made project control systems. The investment follow up, after closeout and project prestudies, has been emphasized (Kähkönen 1996). These were noted to influence on better investment implementation. Research was expected on how project management acts in practice (Engwall 1995).

Concerning the research of the investment project organization and project management, it has been noticed that in a part of the research, project manager's leadership principles and project manager's duties have been studied. A few success/failure factors in the investment project process have been observed. There are only a few studies of human resource management (Fabi and Pettersen 1992). Only in the 1990s has the significance been noticed of: project group and team (Williams 1997; Katzenbach and Smith 1993), empowerment

and organizational learning (Argyris 1977, 1990; Hammuda and Dulaimi 1997; Ayas 1996; Senge 1990), and communication in project management. The focus in risk management has turned from quantitative methods to the development of risk management process and understanding in different project phases, and to the organizing of risk management (Chapman and Ward 1997; Artto 1997; Kähkönen 1997). For the requirements of project managers, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* has been created. In addition, a certification process for project managers is in progress. Lately, cooperation and networks between companies has increased, however research in this area is still rare (Hedberg et al 1997; Guss 1997; Weston and Gibson 1993; Larson 1995).

On the basis of previous research in project management, critical success/failure factors in project phases and conflict situation have been reviewed (Slevin and Pinto 1987; Pinto and Prescott 1988; Adams and Barnt 1978; Cleland and King 1983; Belassi and Tukel 1996; Schultz et al 1987). The survey of critical success/failure factors has also been carried out by dividing the factors into strategy and tactics. Strategic success/failure factors belong to early project management phases (like planning) and tactics phases (like implementation). Conflict management has been noted to be a prerequisite for effective project management (Blake and Mouton 1964; Burke 1969; Thamhain and Wilemon 1975). Conflict management has been noted to be (in order): collaborate, compromise, accommodate, dominate, avoidance (Posner 1986).

Purpose of the Study

The purpose of this study is to investigate and analyze the state and significance of investment project management systems in the implementation of partnership investment projects. Therefore the study:
• Explores the theoretical framework of the investment project management on the basis of previous research
• Describes two partnership investment project management systems
• Analyzes empirical results using the theoretical framework
• Examines differences between two empirical investment projects
• Investigates observations connecting to project success.
Finally, a summary of the main results of success factors and threats in managing investment project are presented.

Research Method

Case Study

In the empirical part of this study, two investment management process and system factors were formed and described, and these were analyzed using the theoretical framework. The aim of the study is to increase the understanding of the special features in the implementation of partnership projects, and the possible differences in the project management process over a ten-year period.

The case study (Ferreira and Merchant 1992; Yin 1989; Scapens 1990; McKinnon 1988; Lukka and Kasanen 1995) was chosen for the reason that, to understand the investment project management process and system features, one needs depth and an intensive research method. The case study method is generally considered to fit the research of complicated phenomena in their practical settings. Complicated, in this context, means that there is only a little explanatory theory and how the phenomenon and its practical settings interact is inadequately known. The goal of case research is not quantification or even enumeration, but rather description, classification, theory development, and limited theory testing. In a word, the goal is in understanding. Case research is resource and time consuming, and it means limits for research objectives.

This case research can be mainly classified as descriptive, exploratory research. The objective of research is to provide information concerning the nature and form of existing practices (Scapens 1990; Ryan et al1992). The study is made from the business management and holistic point of view, where the social system is viewed as a whole and it is not suitable to research the quality of the system without participating people. In the holistic system, the researcher is in that whole which is researched. To assess the validity and reliability of the research, evidence was collected from multiple sources (triangulation) (McKinnon 1988, 34–54; Ryan et al 1992, 121–124; Ferrairi and Merchant 1992, 4). Validity means the ability of the measurement to measure what it is meant to measure. Reliability in case research is understood as the requirement of replication in analysis. The reliability of measurement means replication of measurement, not random.

Observation suits especially well to those situations where it is essential to preserve contact with the whole research object. In observation, the research object is not taken apart from its surroundings, but it is made possible to investigate the relationship of the research object and its surroundings. It is a suitable method for investigating problems that are little known in advance. Participant-observation (Yin 1989, 92–94) means the researcher participates in the group as one member. Informal interviews are often included in participant-observation. The advantage of participant-observations is that the researcher does not influence or create a research situation, so the function and behavior is authentic. The researcher can also get information that would not be revealed to an outsider. On the other hand, participating is also a restricting factor. If, for example, one does research into the function of the workplace by the participant-observation method, the general duties of group member also bind the researcher.

Data Collection

The case study focused on Oy AGA Ab, the Gas Company. For the empirical part of this study, two partnership projects were chosen. These project implementations required their

own project organization and fulfilled, the characters of large projects. The first investment was implemented during the years 1982–1984. The research material for this case study consists of the researcher's own familiarity with the company, interviews, participant-observations, and written documents (see Ferrairi and Merchant 1992, 4, triangulation). In addition, the researcher has self-participated in the implementation of this project. The researcher worked in the company studied during the years 1980–1986.

For interview purposes, people who participated in the first investment project in the acceptance/definition phase and/or later in the implementation were chosen. First, the Finance Director of Oy AGA Ab was interviewed. In the second phase, he went through the research material and made supplementary comments. The Finance Director belonged to the Investment Board during the implementation. Just after the close out of this project, the Project Secretary and the Project Engineer were interviewed. The researcher participated (participant-observation, see Yin 1989) in the process of building the first project management system and assisted in the implementation phase and acted as the secretary in the investment committee where the project was handled monthly. The project implementation from the acceptance to operation took about two years.

In the second investment project, implemented during the years 1993–1995, the researcher interviewed, just after the implementation: Oy AGA Ab's Accounting Manager, Business Controller, Project Manager, and Project Engineer. After the implementation, the Project Engineer who participated in both projects and the representative of Outokumpu, the other Partner Company was interviewed. In addition, Oy AGA Ab's Finance Director was also interviewed. The written material consisted of annual reports and articles about these projects. Also, internal Project Guidelines like, the Project Administration handbook, the Investment Guidelines handbook, Project Descriptions (Project Plans), and other project material of the implementation phase were available.

Summary and the Theoretical Framework

The investment process has been the basis of the investment project management process framework (the framework is founded on the Licentiate Thesis, Hyväri 2000). The investment project management phases were specified on the basis of the previous research: definition, planning and organizing, implementation and control, and closeout.

The investment project definition phase includes the investment process phases on the basis of which the decision to invest or not to invest will be made. After the definition, in the project implementation planning and organizing phase for the accepted investment project the implementation plan will be defined. This includes the project goals and the project organization's specification. In the project implementation and control phase, it was noticed that the project implementation followed the accepted implementation plan. In the control phase, the results realized will be compared to the goals and the corrective actions taken. The project closeout when its results are carried forward to the end users and the final project report has been done.

The investment project organization is responsible for the fulfillment of goals set for the project. The project manager is responsible to the project board. The position of project manager varies according to the project organization form (Gray et al 1990). The project success is affected by how the relation of the project organization and line organization has been defined and the organization chart and job descriptions for project manager and other project personnel been done. The project size had some influence on choosing the organization form and also on how well the project was noted and further to project success. A connection between project managers' authority and project success was observed. The more project managers were able to decide project management systems the better the projects succeeded.

Companies pay attention both to formal systems, i.e., tools and personnel attitudes, and behavior when creating management systems. That different kinds of leadership styles demand different kinds of management systems has been noted. What is the best leadership style depends on the situation and on the leader. According to the situation management model, people at different levels of readiness need different leadership style (Hersey and Blanchard 1988). As to the success of project implementation, it has been noticed that it has been affected positively when a project group has been able to participate in goal setting. The management system affects the person's motivation. An increase in motivation affects further by increasing efforts and accomplishments like also a positive attitude. It has been observed that feedback makes learning faster. On the other hand, when feedback was not given the ability to learn stopped and performance became weaker. A person's attitude and performance has been observed to have a direct connection with the density of feedback given. People who got feedback more often had a better performance level. The method and meaning of communication must be clear both to the sender and to the receiver.

In the implementation plan, are the detailed technical, time, and cost goals, project organization, job description and responsibility charts, timetable, resource and cost plans, and also the description of the project management system is defined. In the project implementation phase, there were found to be more critical success factors and critical conflict factors than in the other phases. Factors in the investment project implementation and control phase are project organization and project implementation planning and organizing, investment implementation, information measurement, reporting, deviations handling, and corrective actions. Current values are compared to goals, and with this feedback it is possible to handle deviations and take corrective actions, i.e., from the control phase one turns back to the implementation planning and organizing phase. With the ADB-information systems, it is possible to make more effective information and control tasks. The project

Exhibit 1. The Investment Project Management Framework
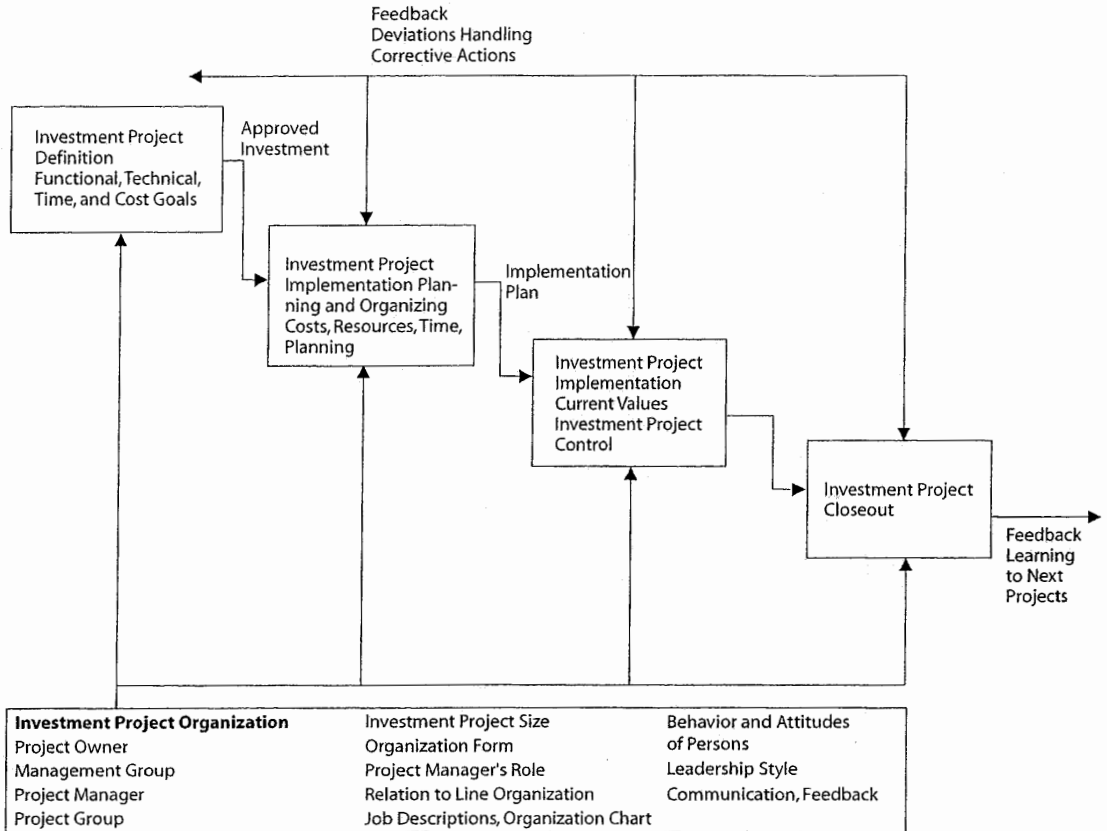
closes out when the set task is done and goals reached and the result has been carried forward to the end users. The project final report where feedback is given for the next projects will be prepared. The investment project management framework is presented as the summary in Exhibit 1.

AGA and Outokumpu Partnership Investment Projects

Oy AGA Ab (AGA)

AGA is the biggest and the most remarkable producer of industry and medical gases in Finland. Finnish AGA, established in 1917, is a subsidiary of Swedish AGA AB. In the years when case investments were completed, the turnover of AGA Group was 5.632 MSEK in 1984 and 13.271 MSEK in 1995. The turnover of AGA was 310 MFIM in 1984 and 610 MFIM in 1995. In the year preceding the first case investment, the investments were 20–25 percent of turnover, and in 1995 were 39 percent of turnover. The production and delivery of gases demands a lot of investment. In 1984, the balance amounted to 637 MFIM and fixed assets were 440 MFIM. In 1995, the balance was 1204 MFIM and fixed assets were 1060 MFIM. Personnel numbers were 623 in 1984 and 575 in 1995.

The head office of AGA is in Espoo. AGA has airgas, acetylene, hydrogen and laughing gas plants, and gas filling and service centers. AGA's functions also include gas and weld applications, gas production in Finland and distribution services in the whole country, and knowledge of gas technology. It has continuously kept gas capacity on an adequate level by building new plants and conducting research and development work together with both domestic and foreign gas users and producers. As AGA is self-sufficient in gas production, it is independent of international disturbances and other production difficulties, and it secures continuous work in domestic industry.

Exhibit 2. Phases of the Project Management Process in the Theoretical Framework and in the OKSO and NiCu Projects, and the Timing of Phases

Phases of the Framework	Phases of the Projects OKSO and NiCu, and the Timing of Phases	
	OKSO	NiCu
	Project Idea	
	Project Proposal	
	Check against Long-Term Plan	
	Decision	
Definition	Prestudy	
↓	Spring 1981	1993
	Preliminary Investment Proposal	
Approved Investment	Preliminary Decision of investment	↓
↓	8, 9/1982	
	↓	↓
Planning and Organizing (Implementation Plan) ←	Investment Study (incl. Implementation plan) Technical, Time, and Cost Goals ←	
	Financing Plan	
	Project Organization	
	Final Investment Proposal	
	Decision 2,3/1983	8.93
	↓	↓
Implementation and Control —	7.1.1983–13.9.1984 30.8.1993–15.6.1995 Purchasing and Detailed Project Implementation Planning ┘	
↓	Building, Installation, Training, and Operational Planning	
	Financial, Cost, Time, Resource, and Progress Follow-Up	
	↓	↓
Closeout	13.9.1984	15.6.1995
↓	Production Startup	
	Guarantee and Technical Follow-Up	
	Strategic and Economic Follow-Up	
	Final Report (One Year after Production Start)	

Phases of the Investment Project

In this chapter, two AGA airgas plant projects, OKSO and NiCu management systems, will be described. Project OKSO was built by AGA during the years 1983–1984 as an on-site plant connected to the Outokumpu Oy Harjavalta plant. Project NiCu was built during the years 1993–1995 by AGA connection to Outokumpu Harjavalta Metals Oy Harjavalta plants. Outokumpu Oy is an important customer of AGA. Exhibit 2 shows the phases of OKSO and NiCu, based on phases of investment projects in AGA. The phases are presented in connection with the theoretical framework.

The phases of the investment project management in the theoretical framework and in the OKSO and NiCu projects, along with the timing of phases, has been presented as a summary in Exhibit 2.

These phases are closely focused in the following chapters. Analyzing OKSO and NiCu project management systems with the theoretical framework observed that the basic system remained unchangeable. However, it was revised so as to be as good as possible for the needs of every project and so that it could produce the necessary feedback information for control purposes. With approval procedures, securing proj-

ect management planning was attempted. Implementation and control phases built an ongoing process.

Differences between the OKSO and NiCu Projects

Project Organization

OKSO and NiCu had separate project organizations, in which people from both AGA and Outokumpu organizations participated, in addition to outside project personnel. Instructions for the project OKSO organization were in the AGA Group Project Administration Guidelines, and in the project plan for project NiCu, as well as in the Quality Manual. The OKSO experience was utilized and, on the other hand, the partnership in Harjavalta Isoproject (two billion FIM) brought additional features for NiCu. In the project, plans were decided, as were the written parties' responsibilities, duties and authorizations, and job descriptions. In NiCu, they were carried out more punctually by more people than in OKSO. AGA Group took part in NiCu as a consulting group, and participated more in the implementation of OKSO. In NiCu, project transfer to the production and personnel training was secured by placing a gas manager in the project at the planning phase and by producing a written job

description for the gas manager. In OKSO, these were agreed during the implementation. Creating an organization chart and job descriptions helped personnel participation, delivery of responsibilities, and authorization to a lower level, i.e., empowerment. In NiCu, those were done more exactly than in OKSO. In this way, it was possible to give people a free hand to act inside specified frontiers, and to motivate and bind them more effectively. In NiCu, a responsibility matrix was created. It was precisely stated who had a total responsibility, a responsibility in the implementation phase, and who had an information responsibility.

Definition, Planning, and Organizing

In project OKSO, a preliminary Investment Proposal was made for AGA's own two-stage project. An agreement with the Outokumpu partnership was then realized and the investment had to be again approved. In the NiCu approval procedure, Outokumpu investment plans were already known and settled in AGA as a condition for a final NiCu approval. A risk management point of view was more emphasized in NiCu, and OKSO's experience was utilized. In the NiCu project plan, the partnership's financial and functional risks and accident risk were more observed.

Implementation and Control

In both projects, there was a control group in which representatives of both partners participated. AGA also had an internal control group called an "investment committee," which was first created for OKSO because of a failed project shortly before OKSO. These control groups had meetings regularly every month or every second month. They handled and accepted the costs. Of course, some cost agreements were made, as well as changes in production process and various other kinds of agreements. The project manager's duty was to state how to solve the problems identified and estimated in the project reports. In the projects, costs were divided for AGA, AGA Group, and AGA-Outokumpu purposes. A NiCu progress report was made quarterly, and monthly in OKSO. For OKSO, cost control was carried out with a computer system, and NiCu had some kind of system. Costs control in OKSO was more accurate because the project before OKSO was failed on a cost basis. In NiCu, the completion stage was also followed and information and quality system matters were documented.

In NiCu, timetables were made in stages. OKSO had only a main timetable. The NiCu timetable was connected to the Outokumpu Harjavalta project. The project engineer of both OKSO and NiCu says: "Project management has advanced a lot since OKSO, because in NiCu was already second generation (people and computers). Ari, 'a personal computer virtuoso,' made all the timetables and was constantly on time. When I was in OKSO, the only computer was a pocket calculator and a pen. As I mentioned, there was only this main timetable. But NiCu had all kinds of finer timetable programs (dates to start and finish), and that helped."

The NiCu airgas plant belonged to a bigger Outokumpu Isoproject and it could not be delayed. An Outokumpu factory stoppage also steered the OKSO project to completion. In project NiCu, more pressure had been put on the equipment supplier control and tests than in project OKSO. The plan for sharing risk was made between partners. Both partners participated in projects from the beginning to the end to get the best result, and also avoiding risks. The role of partnership agreements was emphasized. According to the Outokumpu and AGA agreement, things which could not be agreed on in the project, the partner whose responsibility it was to fill a disputable fact could fulfill commitment in a way that corresponded this partners opinion to benefit both partners. Estimating a fulfillment of commitment, the other partners' resistance was noticed as reclamation at this point.

Estimation of Success in the OKSO and NiCu Projects

In September 1984, the airgas plant built by AGA as an on-site plant to the factories of Outokumpu Harjavalta started test production. Due to the competent and experienced project organization, the final timetable was over two months ahead of plan. The OKSO people had already participated in the same kind of projects and some had also participated in the failed project carried out just before OKSO. The 80 MFIM cost estimate for OKSO included on-site plant equipment and building costs, entrance fees to the electricity net and the cooling water system. The final investment, however, remained a little under 70 MFIM because of minor reductions in investment and a favorable at the time of supply. At maximum capacity, the plant can produce oxygen, nitrogen, and argon, together making up 100 million cubic meters per year. According to an agreement of 1 July 1983, Outokumpu will buy three quarters. With the rest, AGA secures liquid airgases for Finnish industry. AGA sales were at a good level and conditions were also good. The building of the plant was profitable both for AGA and Outokumpu. One big plant cost 30 MFIM less than the intended two smaller plants together. Production as a partnership was also more profitable.

In the literature, it was stressed that it is important to pay attention to responsibility clauses, as was in these OKSO and NiCu projects. AGA's managing director stated: "The AGA plant in Harjavalta is an excellent example of an advanced, fixed partnership with AGA and the customer. AGA and Outokumpu signed the partnership agreement in 1983. According to that, AGA built an on-site plant in connection to Outokumpu Harjavalta's own oxygen plant. The new plant enables enlargement of Outokumpu nickel and copper production. Ten years later, Outokumpu decided to nearly double copper and nickel production until the year 1997 through two billion investments. Production enlargement also required more gas. In August 1993, AGA and Outokumpu Harjavalta Metals signed an agreement for the building of a new oxygen plant. This plant produces airgas for the needs of both parties. As AGA, an expert in gases, took responsibility for building the plant and producing the gases, Outokumpu was free of capital binding in investment for producing raw

materials. In this partnership, AGA obtained the extra capacity needed to be able to fill the increasing need for gas in Finnish industry over the turn of the next millennium. Compiling resources in that way, it was possible to obtain economical advantages for both partners."

On 6 June 1995, according to original timetable, AGA's new airgas plant was realized. The critical element in this NiCu timetable was an air compressor. It was seven weeks late at the beginning of project but the supplier was heavily controlled, more than OKSO. Yet, at least the air compressor was only one week late and did not cause trouble. In NiCu, licenses of authorities and security explanations took the time and work capacity of a lot of key people, as, during the NiCu project, new statutes of chemistry law came into being. The plant is able to produce about 500 million cubic meters of oxygen, nitrogen, and argon yearly. Even though Outokumpu Harjavalta Metals uses the main part of the oxygen and nitrogen, AGA also gets extra capacity and so this new plant gives AGA more possibilities to serve other customers in Western-Finland. The scene for AGA was favorable. Turnover increased and profitability improved. This airgas plant was part of AGA's 600 MFIM investment program. Thanks to the good partnership of AGA and Outokumpu, it has been possible to obtain advantages for this NiCu from Outokumpu's billion Isoproject. It has been possible to make supplies together and this partly reduced the total costs under the budgeted amount. The approved cost estimate for NiCu was 179,1 MFIM, the internal goal was 164,4 MFIM and final costs were 138 MFIM. Savings in investment were obtained due to cheaper deliveries of main equipment (in process, compressors, containers), in building and electricity, because it was possible to utilize the same discounts in the NiCu project as in the bigger Outokumpu Harjavalta project and, at the same time, saving in supply resources. An automation system, that in the previous OKSO took lots of resources, was taken accordingly to the Outokumpu Isoproject, which brought savings in NiCu. In studies of the United States Army Corp of the engineer partnerships (Weston and Gibson 1993), it was noted that it is possible to obtain positive results with partnership projects in costs, timetables, change costs, and complaint costs; compared with projects not carried out as partnership bases (for other similar results see Larson 1995). As mentioned before, in OKSO and NiCu positive results were achieved. In the implementation phase, the project timetable/plan and technical duties have been critical factors in success (Slevin and Pinto 1987; Pinto and Prescott 1988; Honko et al 1982). In OKSO and NiCu, technical goals were reached. OKSO was ready over two months earlier than the official/budgeted timetable. NiCu was also carried out within the timetable.

It has been noticed that the competitiveness of organizations depends on how well they can work as teams and solve problems (Williams 1997; Katzenbach and Smith 1993). Extracts from the speech of the Outokumpu Harjavalta Metals Oy managing director, in the airgas plant inauguration 10 November 1995 state: "When, in 1992, Outokumpu started to prepare the enlargement of copper and nickel pro-

duction, it had to decide at the same time how to produce the airgases needed in this production. A decision to concentrate on this was easy in many ways, i.e., the production of metals. Outokumpu can experience metal business with many decencies and we can say the same of Oy AGA Ab's airgas functions. We felt that AGA knows what it does in connection with the first oxygen plant building (here in Harjavalta). AGA has kept its knowledge up to date when building the airgas industry all over the world. In my opinion, everything went well in the AGA's new airgas plant building. It is not an insignificant detail, if we remember that the Harjavalta enlargement project was the biggest investment in Finland at that moment, nearly two billion FIM, and at its best and largest, 2,500 people worked here. The implementation was carried out so that copper and nickel production were in operation nearly the whole time. The airgas plant has been built with the newest knowledge: new colony technology, advanced electricity automation, still lower energy consumption, and higher security level are some essential factors to mention. In many sections, we have been able to utilize advantages when making these investments at the same time. Many thanks to all participants during the building, both for good cooperation and for flexible attitudes. Everything has run faultlessly and the partnership has been smooth. I have noticed the great amount of work and effort that, in these conditions, has been needed to carry out new airgas plant." As Outokumpu Harjavalta Metals Oy managing director stated in the inauguration speech, companies could function as teams and, after the compliment for these OKSO and NiCu projects, the competitiveness of partnership organizations rose.

On basis of previous studies, the clearance of goals and general guidelines are remarkably critical factors. In the OKSO project, the project manager did not know AGA's building habits. The project secretary did not get the information of extra and change works quickly enough. The condition of the agreements and the termination of currencies in deliveries were not totally known to the responsible people. After all, in OKSO, these factors did not cause problems but just a little confusion. In the theory part, it was noticed that team building in partnerships could be helped in a formal way of working, by arranging kick-off seminars and meetings so that project people work together from the beginning of the project phases. A kick-off seminar could have helped in OKSO. In the NiCu project, information flow between Harjavalta-Lidingö, Sweden, and Germany did not occur directly but through the middleman, and it was felt to be heavy. "One should act directly in the future," wishes the project manager. The conditions of deliveries and agreement DDU Harjavalta was known to the project organization and purchasing people. In NiCu, the handling of delivery currency was known. According to the researcher: "These problems were avoided in project NiCu, because people had learned from OKSO's mistakes and these problems were specially discussed at the NiCu kick off." A Letter of Intent way of agreeing was not good; agreements should have been

made at once, not 3–4 months after the signing of the Letter of Intent, because the making of agreements was much more time consuming. The NiCu project manager wished that "agreements should make ready at once." A project breakdown could have been done in other way. The project engineer from NiCu sent greetings to future project managers: "In the future, more should be invested in recourse planning and earned value method."

Consulting with the customer and project selling to end-users have been observed as previously very critical factors (Slevin and Pinto 1987; Pinto and Prescott 1988). In projects NiCu and OKSO, these were avoided because the customer and the end-users participated in project implementation and were bound to the end result. Outokumpu representatives answered the researcher's question: where could you have been luckier? "Project implementation. I remember one thing from the Harjavalta project preparatory course. The first thing told was that, when a project has been well planned and has been accepted, changes are not allowed because one change becomes many more other changes. It extends like a chain letter."

The OKSO and NiCu project leadership was partly outside the investing company, which caused some problems in coordination and responsibility, but these did not affect the project result. Outokumpu was not totally happy with the OKSO organization and therefore, at the beginning of the NiCu project, these parts had to be considered again. In project NiCu, the planning was divided into more parts than in OKSO, and that caused some pain to project organization. After the NiCu project implementation, the project engineer noticed that "responsibilities and empowerment could have been stated more clearly in the project plan, for example, in the matrix form." Outokumpu representatives and the OKSO project manager commented about conflicts: "There are always conflicts in life and these must be adjusted. Both parties tried to obtain advantages from this project, so I simply tried to look after the project interests, not the interests of the other partners. Made after the agreement, the choice of an OKSO project manager suited AGA. As I see it, this was the kind of idea that, when this plant was built to the Outokumpu factory area and there were these borderlines to Outokumpu, then, when the OKSO project manager came from Outokumpu, Outokumpu could not comply too much, and it makes life in the project easier. I was not project manager in the NiCu project because the same person is not usually named again and, actually, I had other work at the Outokumpu Harjavalta project. The NiCu project manager came from AGA."

The researcher did not observe so many situations of conflict in the OKSO and NiCu projects that it would be possible to describe in which phase or what factor caused conflict and how much was caused. Research has demanded enquiring through phases. An Outokumpu representative, OKSO project manager: "Other conflicts? In general, OKSO was carried out very well. There were special people (strong characters), but there were not those kinds who cause disturbance. I myself was happy with that, and also with the

end result, i.e., with the timetable and with the costs, which stayed under the budget. The NiCu project was carried out with good cooperation and, as far as I know, there were no conflicts. Neither for the Harjavalta Isoproject, I have not heard of any conflicts." With a basis of analysis (Jeffrey Pinto 1990, Project Implementation Profile) using these measures, it was observed that OKSO and NiCu projects succeeded in each phase. No significant conflicts were observed, or conflicts were resolved quickly so that they did not cause any negative effects on the NiCu and OKSO projects. Conflicts were handled in cooperation (collaborate/confrontation method).

Discussions and Summary

The purpose of this study was to investigate and analyze the state and significance of the investment management system in the implementation of the partnership investment projects. In this summary, the main results of success factors and threats in managing investment projects are presented. In this research, the investment project is defined as having succeeded when it fulfills the financial, technical, time, and cost goals decided in the project plan. The investment project management system helps to achieve the goals. Previous research as a basis for the theoretical framework and phases of investment project management and investment project management system factors were reviewed. Previous research also points out the critical success factors in the project phases. As a response to the research problem, the theoretical framework of the investment project management system was described. The framework could be used to analyze empirical results. The phases of investment project management are definition, planning and organizing, implementation and control, and closeout. The phases build a process.

In the empirical part, two Oy Aga Ab and Outokumpu Oy/Outokumpu Harjavalta Metals Oy partnership airgas plants, projects OKSO and NiCu were described and analyzed. The projects were carried out over a ten-year period. The investment project management process and system factors were described and these were analyzed using the theoretical framework. By analyzing the empirical factors in OKSO and NiCu using the framework, it was discovered that the project management process and system factors mainly corresponded with each other. According to the project success valuation in the OKSO and NiCu, certain conventional failures were avoided. On the basis of the analysis, it can be stated that the framework is serviceable in building the investment project management system in practice. It can help to make sure that any central factor will not remain unnoticed.

In the following, the prerequisites and threats for success in investment project management have been summarized. The summary includes empirical observations compared to the framework, differences between projects OKSO and NiCu, special features in partnership projects, and observations connected to project success.

Empirical Observations Compared to the Theoretical Framework

In the empirical analysis, it seemed just as in the framework, that the basic system in project management stays unchangeable, but it is controlled and changed to respond to each project separately. Recently more attention has been given to the definition and planning phases. In the empirical analysis section, it was stated that during implementation the changes are harmful because one change in that phase results in many other changes. Implementation and control forms an ongoing process, where the aim of the investment management system is to reveal shortcomings and to take corrective action before the project drifts into crisis. Connected to this in the empirical analysis, it was noted that the project plan becomes more precise during the project implementation and control phase. In the project final report, the need was observed to report things to be developed in subsequent projects so as to secure learning.

According to empirical observations, project managers should have a good knowledge of project management and especially of contracts and contract techniques. Project personnel and especially project managers' experience, especially in change management, was perceived to have great significance for project success. In managing project, it is important to know how to handle both the tools and the people and to keep the balance between these. Concerning the project management organization, it was stated that organization chart and job descriptions were done and communicated. Responsibility and power questions and the way to handle crisis and organization were decided and were made clear to all participants. Project people had the opportunity to participate in goal setting. In that way, learning in the organization and commitment could be secured. Decision-making in the right place and ongoing communication directly with people without a middleman commits and motivates.

Special Features in Partnership Projects

Special features of partnership can be noticed in organizations that have started partnership projects for synergy advantages. Facts in these partnership projects were agreed beforehand and in writing. Organization to handle critical facts was agreed beforehand. The personnel in partnerships took part in the projects from making a partnership agreement to closing out the project so ensuring commitment and also getting the best result concerning project risk. In that case, during the implementation the project situation was reported to both partners. The transfer of investment to the final users was notified during the project. The end-users participated in the project implementation. Contract negotiations, contracts, and goal settings had the main roles in the decision to participate in the partnership project.

Differences between Project OKSO and Project NiCu

Project NiCu was carried out ten years later than project OKSO. In project NiCu, organization responsibility and power questions and how to handle crises were decided more precisely than in OKSO, because NiCu was part of a bigger project and in its implementation people from Outokumpu Isoproject also participated. In project NiCu, the end-users of the investment were brought into participate already in the planning phase. In connection with the OKSO project, the investment committee was started, where investment projects were followed up monthly, because cost estimates in the project just before OKSO had failed. Acceptance of the OKSO project happened in many phases, in project NiCu only in one phase. Risk control in business risks, financial, and accident risks got more emphasis in the NiCu project. Timetables were made for different levels in the NiCu project; in OKSO there was only the main timetable. In the NiCu project, this was possible because the NiCu timetable was made by computer and OKSO by hand. For the OKSO project, the ADP-system was made for cost control; NiCu used the same kind of system. The state of readiness was reported more precisely in project NiCu, also communication matters and quality matters were documented. In project NiCu, project people participated in control and tests of equipment more than in project OKSO.

Observations Connecting to Project Success

The success of project OKSO and project NiCu was influenced by qualified and experienced project organization. In addition, in Oy AGA Ab's environment good conditions prevailed and development in sales was good. The building of plants as partnerships was profitable for both AGA and Outokumpu. Profits came both in investments and in production costs.

The management of project OKSO and project NiCu was partly outside the investing company, which caused some problems in coordination and responsibility, but this, did not have any effect on the project success. Responsibilities and empowerment could have been stated more clearly for example in matrix form. The breakdown of planning caused some pain for the NiCu project organization compared to OKSO. Clearness of goals and guidelines were, according to previous research, very critical success factor. These problems were also observed in the OKSO and NiCu projects but they did not affect the results of these projects. Planning of resources, the earned value method, communication networks, and making contracts should be paid more attention in the future. Consulting with customers and project sales to the end-user did not seem to be a problem in these projects because customer and end-users participated in project implementation and were committed through this to the end result. The researcher did not observe significant crises, or crises did not affect success of the project negatively.

Conclusions

In the empirical part of this research there was a case study of two partnership investment project management projects. The research results concern mainly only the researched

investment management system, but they partly help to understand investment project management systems generally.

According to analyses, the theoretical framework can be used in making investment project management systems and with that making sure that no central factor is omitted. Comparing the OKSO and NiCu projects management system, it could be noticed that in both projects the same features appeared. In these projects certain conventional failures were avoided.

Considering the purpose of the study, the case study appeared as the theoretically most promising and economic method of enquiry. In this case study was observed in the profound and intensive way the problems in management of partnership projects: management of two investment projects and changes in project management over a ten-year period. This study is the basis for the further research of the project management effectiveness and success/failure factors.

Acknowledgements

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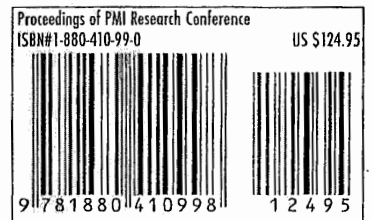
Project management effectiveness in project-oriented business organizations

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Abstract

The aim of the study is to investigate the effectiveness of project management in terms of organizational structures, technical competency, leadership ability and the characteristics of an effective project manager. The subjects of this survey study were modern project-oriented business companies. The results indicate that organizational design is associated with project management effectiveness. For example, they indicate that project matrix and project team-based organizations are the most effective. Moreover, respondents are reasonably satisfied with the currently available selection of project management tools, yet a need was stated for multi-project management tool. The characteristics of an effective project manager were measured by means of leadership behavior in 14 managerial practices. The results suggest that planning/organizing, networking and informing are the most significant managerial practices in the leadership behavior of project managers. This study provides empirical evidence on project management effectiveness with the intent of contributing to a better understanding and improvement of project management practices.
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Keywords: Project management effectiveness; Organization structures; Project management tools; Leadership

1. Introduction

Companies are increasingly using projects in their daily work to achieve company goals. There is a growing need for the management of projects in business organizations. In recent years, researchers have become increasingly interested in factors that may have an impact on project management effectiveness. Prior research in the area has examined different ways of organizing project management [1–6]. Projects carried out in a multi-project context have been studied [7,8]. In addition, issues relating to technical competency, i.e. tools and methods in project management practices have been considered [9,10]. In particular, final cost methods [11] and earned value [12–14] have been studied. Critical success and failure factors in project management [15–18] point out the need for empirical studies of how project management tools and methods could be used to improve the quality of project management. In addition,

there is an increased need for knowledge about how these tools are used in actual project management practices within organizations.

A human resource management (HRM) study in project management has indicated that HRM practices are little researched [19]. It has been concluded [20–22] that project management effectiveness requires project managers to combine technical competency, i.e. tools, with the ability to develop and display leadership. However, there is little research that shows how technical competency and the process of leadership in project management are combined [20–22].

This paper aims to partly fulfill this gap by presenting results from a survey made on organizations in modern project-oriented business companies. The subject companies are project-oriented in the sense that their main mode of operation builds on developing and selling large-scale business-to-business products and services (for example, engineering and construction projects) tailored to fit customer needs. The survey, carried out between December 2002 and February 2003, focused on the perspective of

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the project client/owner/sponsor, and included projects carried out for the company's own purposes. More specifically, this study investigates the effectiveness of project management in terms of: (1) organizational structures, (2) technical competency, i.e. project management tools and methods, (3) leadership ability, and (4) the characteristics of an effective project manager within the context of organizations which are managing projects for their various own particular purposes.

This paper is organized as follows. First, a literature review and the purpose of this paper are presented. Then, the key results of the survey are presented and discussed. These results are also compared with previous results presented in the literature review. Finally, the paper concludes with a brief summary of the main findings and some of their implications.

1.1. Literature review

The research addressing project management effectiveness in project-oriented business organizations includes the following themes: (1) organizational structures, (2) technical competency, i.e. project management tools and methods, (3) leadership ability, and (4) the characteristics of an effective project manager. The following review of previous research on these aspects indicates the current state of knowledge and the gaps in knowledge concerning project management effectiveness in different organizational conditions.

Organizational structures ranging from the classic purely functional organization to the opposite end of the spectrum, the projectized organization, have been presented (PMBOK [23]). In projectized organizations (or project teams) most of the organizational resources are involved in the project work. Matrix organizations are a blend of functional and projectized organizations. Matrix organizations are defined by Gobeli and Larson [4] as functional, balanced and project matrix organizations. PMBOK has named these matrix types as weak, balanced and strong matrices. Most modern organizations include all of these structures at various levels. Even a fundamentally functional organization may create a special project team to handle a critical project. Project managers interact continuously with upper-level management, perhaps more than with functional managers. Kerzner [5] has presented the effectiveness of dealing with upper-level management. Within organizations, companies have organized project offices which specialize in managing projects more effectively [6]. The project office is an organization developed to support the project manager in carrying out his duties. The project team is a combination of the project office and functional employees. In larger projects and even with some smaller investments it is often impossible to achieve project success without permanently assigning personnel from inside and outside the company. Project management effectiveness refers to the success of the project. Both the success of the project and the career path of the project manager can depend upon the working relationships and expectations established with upper-level management [5].

The project matrix and team organization structures were rated according to their effectiveness in a sample of European and Japanese firms. Project managers of multinational projects should be aware of the differences in structures and their relative effectiveness so that they can agree on the approach that will best meet project objectives [2]. It has been observed that efficiencies provided by the matrix structure may be negated by a lack of job satisfaction experienced by the functional manager [1]. The matrix form was seen to be the most dominant [3], and research was concluded with the note that further research is needed on the human and social issues.

Technical competency means the competency to use project management tools and methods to carry out projects. Technical competency has been researched by Fox and Spence [9], and Pollack-Johnson and Liberatore [10]. A survey of project management institute (PMI) members in the USA shows that most project management professionals rely a great deal on project management software [10]. Another survey confirms that there are literally dozens of project management tools on the market [9]. However, the majority of project managers tend to use only a small subset of these tools, the most widely used being Microsoft Project [9]. In general, project managers seem to be satisfied with the tools available even if they are not using tool to their intended capacity. Payne [7] concluded in his paper that it is estimated that up to 90%, by value, of all projects are carried out in the multi-project context. In that environment, one needs a project management tool that is capable of dealing with time and capacity simultaneously. De Boer [8] states that we may conclude that the project management theory does not provide sufficient support for the management of (semi-) project-driven organizations. De Boer has developed a decision support system to assist the management of resource-constrained (semi-) project-driven organizations in planning and scheduling decisions. To test the system, a prototype was developed in cooperation with the Royal Netherlands Navy Dockyards.

The literature [11] offers several methods of forecasting final project cost, based on the actual cost performance at intermediate points in time. The Zwikael et al. [11] study was the first empirical study to carry out a numerical comparison. Earned value [12] is a quantitative approach to evaluate the true performance of a project both in terms of cost deviation and schedule deviation. It also provides a quantitative basis for estimating actual completion time and actual cost at completion. Earned value is a very powerful project management tool. If an organization can effectively integrate this tool into their procurement, timekeeping, and executive information system, then it is probably the single best method for measuring and reporting true project performance and estimating time and cost to complete [12]. However, the effective use of this important technique is relatively rare outside of the US government and its contractors. Earned value

is one of the underused cost management tools available to project managers [12–14].

The respondents in the previous study of Zimmerer and Yasin [20] were asked via open-ended questions about the factors contributing to an *effective project manager*. It was found that positive *leadership* contributed almost 76% to the success of projects. Negative or poor leadership contributed 67% to the failure of projects. In interviews with five vice presidents of major engineering consulting firms, it was found that, of 1000 large and small projects, the executives could recount only 10 failures that were due to lack of technical competence. All the evidence of recent research supports the idea that successful projects are led by individuals who possess not only a blend of technical and management knowledge, but also leadership skills that are internally compatible with the motivation of the project team [1,24,25] and externally compatible with client focus strategies. Posner [26], Thanhaim and Wilemon [27,28] have studied conflict management styles and issues that cause conflict.

Leadership can be defined in many ways [29–34]. Leadership is a process of influencing others so that they understand and agree about what needs to be done and how it can be done effectively, and a process of facilitating individual and collective efforts to accomplish shared objectives [29]. The most commonly used measure of leadership effectiveness is the extent to which a leader's organizational unit performs its task successfully and attains its goals. Most researchers evaluate leadership effectiveness in organizations in terms of the consequences of the leader's actions for followers and other organization stakeholders, but the choice of outcome variables has differed considerably from researcher to researcher [29]. Yukl [29] states that in most leadership definitions it is assumed that leadership involves a social influence process whereby intentional influence is exerted by one person over other people in an attempt to structure the activities and relationships in groups or organizations. Project management literature is mostly based on team literature [35]. The knowledge developed by the social science in the 1960s and 1970s on the dynamics of small groups is rarely used, if at all [35].

Leadership behaviors are sometimes measured with a questionnaire called the Managerial Practices Survey (MPS) [29,36,37]. The taxonomy has 14 behavior categories, or "managerial practices", with Yukl [29] providing a definition for each one. MPS measures categories of managerial behavior that are relevant to *managerial effectiveness* and applicable to all types of managers. The 14 behaviors can also be related to the four general types of activities [29]: making decisions, influencing people, building relationships and giving-seeking information. Kim and Yukl [36] have studied the relationships of managerial effectiveness and advancement to self-reported and subordinate-reported leadership. They have also presented a rating scale by using a nine-response choice.

In conclusion, a review of previous literature suggests that there is not enough knowledge on project management in organizations where projects are used for other own particular purposes. There are a few empirical studies of project management in business organizations and only a few studies of the effectiveness of project management in these kinds of organization. There is an evident need to analyze the status of technical competence and leadership ability in project management. This paper aims to partly fill this gap by providing empirical evidence of project management effectiveness in the context of business organizations. The focus of the paper is on issues relating to organizational arrangements, technical competency such as project management tools and methods, leadership ability and the characteristics of an effective project manager.

2. Empirical data

First, in order to test the validity of the questionnaire, it was sent on a pilot basis to five project managers in five organizations. Their responses were used to revise and improve the questionnaire. Then an e-mail enquiry was sent to 78 company members and 368 individual members inviting them to participate in the project management survey. A total of 30 responses were received. These respondents were then asked to participate in the actual survey, which was carried out between December 2002 and February 2003. Twenty-five responses were received and all the 54 questions were answered. The results were statistically analyzed for correlation and reliability, with the aim of deriving insights into various relevant factors.

In this research, the survey started with the question: "Are you interested in learning about the nature of projects and project management in your organization?" The survey, which included 54 questions and about 400 subtitles, collected a great amount of data. There were 14 open questions. The survey included questions on the general background of the respondents and projects, as well as questions on the respondents' organizations, tools and leadership styles. In addition, the survey included questions on success/failure factors and the ways of handling conflict. People were asked to take part in the survey only if they had been actively involved in managing a project, and were asked to base their responses on their most recently concluded project, even if that project had been curtailed or abandoned. The survey focused on the perspective of the project client/owner/sponsor, and included projects carried out for their own purposes.

3. Research method

The present survey study utilizes the results of previous qualitative, descriptive case studies [21,22] (Hyväri 2000, 2002) to avoid bias and errors attributable to the limitations of the survey. In addition, three interviews were conducted. The study made use of the *t*-test for Equality of Means and Spearman's rank correlation test [38,39]. Data from the survey were imported from Microsoft Excel to SPSS statistical software for analysis.

4. Survey findings

4.1. Background variables

The industry sector breakdown of respondents' organizations is in Fig. 1.

The company/organization size in terms of turnover and number of employees is shown in Appendix of descriptive statistics of the survey organizations. Most of the companies had a group turnover of EUR 31–50 million, and four companies had a turnover exceeding EUR 150 million. Nearly 60% of the companies/organizations had 100–1000 employees, 8% had fewer than 10 employees and 4% had more than 5000 employees. In the previous Pollack-Johnsson and Liberatore survey [10], over 50% of respondents worked for organizations with more than 1000 employees.

The respondents' background profile is also shown in Appendix. Regarding the respondents' backgrounds: 32% of respondents identified themselves as top-level, 52% as middle-level and only 16% as another level. During the previous 12 months, 60% of their work effort on average had been project management (standard deviation 35.5), and they had participated on average in six projects (standard deviation 8.3). The projects are carried out in a multi-project environment. Most of the respondents were project managers with 19 years (on average) experience in total, and 12 years (on average) as a leader or member of a project team. In the previous Gray et al. [2] study, 40% of respondents were project managers. Over 35% of these respondents had 5–10 years experience and 25% reported over

10 year's experience as a project manager. The size of projects was EUR 85 million on average (from EUR 0.02 to 1500 million) and the average project duration was 18 months (from 3 to 42 months).

The projects were classified into eight types on the basis of responses. 24% of the respondents were involved in IT/software development and an equal percentage in investment projects. More responses are shown in Fig. 2. In the previous study [2] approximately 60% of respondents were most familiar with construction projects whilst 40% were familiar with development projects.

4.2. Organizations

In this study, the use of different types of organizations and their effectiveness in project management in modern progressive organizations was examined. The respondents were asked to select the organization type that best described their organization. The definitions used for organization type ranking (functional organization, functional matrix, balanced matrix, project matrix, and project team) are in [4]. The organization type most used by respondents was the functional matrix and the project matrix (both 28%) and the project team at 24%. More results are shown in Fig. 3.

The previous study [2] indicated that respondents familiar with construction projects more frequently use a project matrix. Development organizations appeared to use all of the matrix structures. Chuad et al. [3] examined the use of different types of project management structure in 84 case studies from different industrial sectors in Hong Kong. It
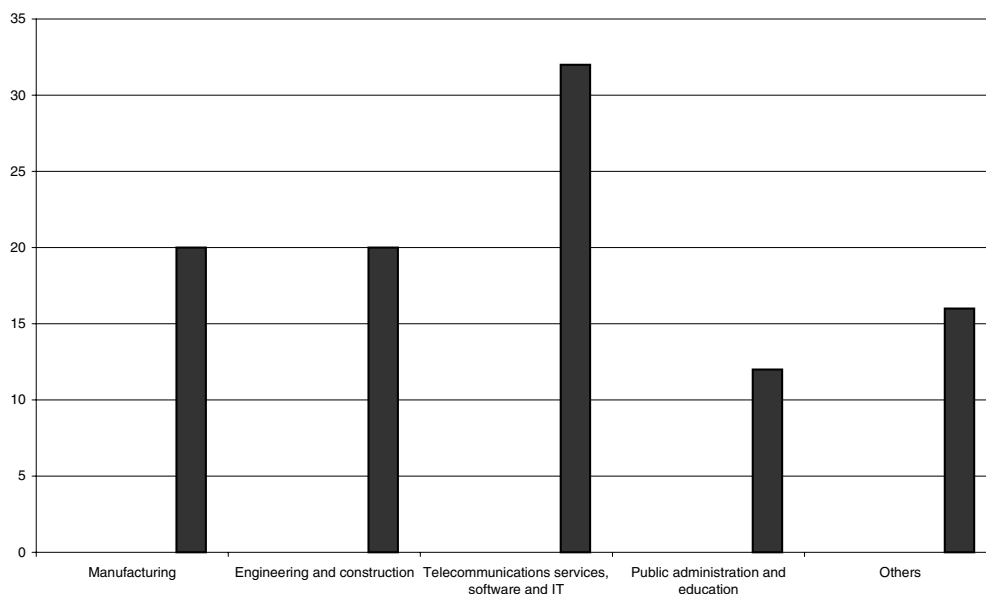
Fig. 1. Industry sector breakdown of respondents' organizations (%).
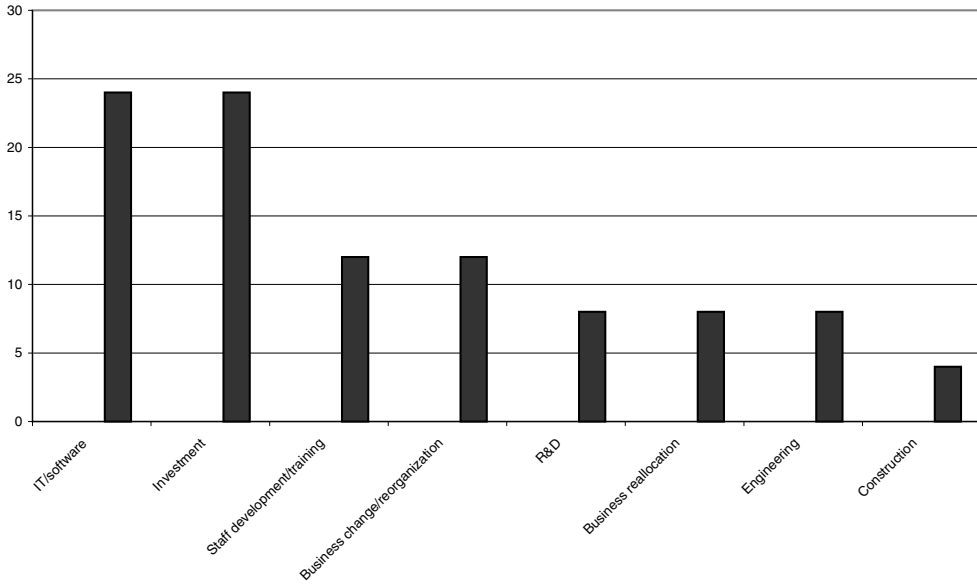
Fig. 2. Project types on the basis of responses (%).
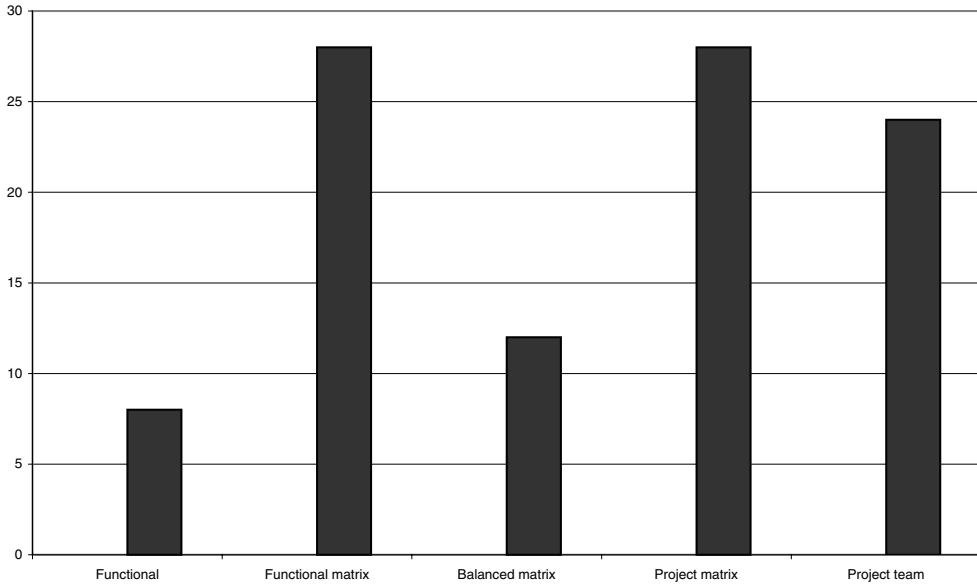
Fig. 3. Organization types used by the respondents (%).

was found that the matrix structure is by far the most widely used (64%) project structure. In this study, the matrix was used in 68% of cases. In Turner et al.'s research [1], the use of matrix structures in a USA government research and development center was studied. 17 functional managers and 14 project managers responded. They found that the project matrix was selected in 64% of cases, the functional matrix in 23% of cases and the balanced matrix in 13% of cases. (See the respondents of this study in Fig. 3).

The respondents in this study also rated the effectiveness of the different structures (a description of organizational structures is in [4]) in their organization. They felt the pro-

ject team to be the most effective, and the project matrix to be the second most effective. The functional organization was felt to be the least effective. The project matrix and project team were also rated as the most effective in the Internet [2] sample.

Most organizations in the multi-project context are matrix organizations [7]. In (semi-) project-driven organizations a standing committee can be an effective instrument for coordination among parallel projects. This is called portfolio management [8]. Project management environment in this study represents multi-project management. Project management in this study was defined in half of the respondent organizations on portfolio level, on project level in about 70% of organizations and some on program level. According to this study, during project implementation, the project board (steering committee, representing the owner/sponsor/client) and project manager mostly made decisions in the case of deviations. Respondents were also asked how they felt concerning the communication effectiveness in projects. Respondents felt that projects usually had written procedures/practices (project guidelines, project implementation plans or similar documents). Respondents usually understood their roles and responsibilities in projects. They also felt that they got accurate information and had adequate access to people with the information necessary for them to perform the job well. They also understood well enough what information their supervisor and other groups in the project in question expected from them.

4.3. Technical competency

In this study, project management effectiveness in technical competency, i.e. tools and methods, was identified. Respondents were asked to indicate the approximate year in which they first used project management tools. This was between 1969 and 2000, and on average in 1985. Project management software tools had been used in 75% of projects in the past 12 months, as they had 2 years earlier, and in 60% of projects 5 years earlier. In a previous study, Pollack-Johnson and Liberatore (1998) [10] found that project management tools had been used in the past 12 months in 92% of projects. In the past 12 months respondents used project management software for project planning (96%), project control (76%) and general work planning and presentations (60%). In the previous study [10] project management software had been used for project planning (95%), control (about 80%) and general work planning and presentations (nearly 70%). Microsoft Project was the most used (44%), followed by companies' own models, Microsoft Excel, and others. In the study of Pollack-Johnson and Liberatore [10], the package most frequently used in the previous 12 months was Microsoft Project, cited by nearly half of respondents. The next most popular was the Primavera Project Planner P3 at 21%, with all others at 5% or less. In another PMI survey [9] Microsoft Project was also first in the top 10 project management

tools, at nearly half, and was followed by Primavera Project Planner, Microsoft Excel and Project Workbench and others.

In this study, the link between the use of project management tools and project management effectiveness was made by asking about people's satisfaction with these tools. People were satisfied with these tools in 84% of cases and dissatisfied in 16%. People were dissatisfied because a good tool for the management of a multi-project was not available (for similar results, see [7,8]), or public sector management tools were not good enough in some cases. Project managers are reasonably satisfied with the currently available selection of project management tools according to this and the previous study [5].

The literature [11] offers several methods for forecasting final project cost, based on actual cost performance at intermediate points in time. The Zwikael et al. [11] study was the first empirical study to carry out a numerical comparison. This study concluded that methods to estimate final project cost were only used partly. Only 60% of respondents admitted to use that kind of method. The named methods were just Excel sheets or companies' own methods, work estimations, and budgeted costs versus actual costs. The reasons given in this study as to why the method for final project cost was not used or only partly used were that the method is not known or that projects are too small. Earned value is one of the underused cost management tools available to project managers [12–14]. In this study, usage of the earned value method for evaluating project performance was 0–19% in 22 projects and 50–79% in 3 projects. The main reasons given for the low use were that the system is too cumbersome and large to use, the projects are too small, or that it is not known.

4.4. Leadership ability

Project management needs leadership skills in order to carry out a project. How this is done in practice in organizations has been little researched [20]. This study aimed, through surveys, to identify leadership ability in the project management carried out in business organizations. The survey consisted of questions concerning the importance of leadership ability in project management effectiveness. The survey respondents ranked the first three factors of an effective project manager as being a good communicator, being a good motivator and being decisive. The most important factors according to Zimmerer and Yasin [20] were leadership by example, being visionary, and being technically competent. These factors were the next three characteristics of an effective project manager identified in this study. The most critical finding was that five of these six characteristics were managerial in nature. The technical competence factor was ranked only sixth in this study, whereas it had been third in the previous study. In the study of Hohn [35] to the question "What are the conditions in the start-up phase for success in an innovative

team" was answered by the leaders (including project managers) by reflecting their own experience (1) motivation, (2) group dynamics, (3) clear goals, and (4) selection (people).

Concerning conflict management the respondents were asked the following: In what issue are conflicts most likely to emerge in the named factors? The answers in rankings were (a) manpower resources (staffing), (b) cost objectives, (c) schedules, (d) personality conflict, (e) project priorities, (f) technical conflicts, and (g) administrative procedures. In the studies of Thamhain and Wilemon [27] and Posner [26] schedules were the first in conflict factors. Manpower resources were in the first place in this study, in the fourth place in Posner and in the third place in Thamhain and Wilemon. More results are shown in Table 1. In rank correlation, a positive correlation was found between this study and Posner's study at the value 0.607 and between Posner's study and Thamhain and Wilemon's study at the value 0.571. This study and Thamhain and Wilemon's study were, at the value 0.107, nearly statistically independent (i.e. 0).

Conflicts were most likely to emerge in the implementation and control phases in this and the previous study of Posner [26]. In this study conflicts were the second most likely to emerge in the planning and organizing phase. The third most likely conflicts emerged in the definition phase. In the previous studies [28,27], conflicts emerged in the early project phases and diminished towards the end of the project.

The conflict management styles used were confrontation or problem solving, compromising, smoothing or accommodating, forcing or dominating, withdrawing or avoiding. Compared with previous studies [26–28] the rankings were the same. Blake and Mouton [40], Burke [41], and Barker et al. [42] also named confrontation or problem solving as the most effective conflict management style. It has been noticed that forcing is the least effective. Project managers use different conflict management styles depending on the situation.

4.5. Characteristics of an effective project manager

In this study, the characteristics of an effective project manager were measured by a method called the Managerial Practices Survey (MPS) [36,37,29]. Respondents were asked to describe and scale the leadership behavior of the project manager in their latest project. The MPS taxonomy had 14 behavior categories, or "managerial practices". The Managerial Practices Survey (MPS) is in Table 2. The validity and reliability of the behavior scales are described in Yukl et al. [37]. The leadership behavior of the project manager and the ratings of leadership behavior are averaged in Table 2. In this study, planning/organizing and informing were ranked as the highest of these taxonomies, and rewarding as the lowest. In unsuccessful projects these ratings of "managerial practices" were lower on average. The most remarkable differences between successful and unsuccessful projects were found in the networking and planning/organizing factors. In the study of Kim and Yukl [36], the highest ranked were conflict management/team building and supporting.

Overall, the rank correlation between Kim and Yukl's [36] managers' rating and the corresponding rating by the respondents in this study is virtually zero (0.011). In contrast, there is a small positive (although statistically non-significant) correlation of 0.342 between the rating in this study and that of subordinates in Kim and Yukl's [36] study.

The overall effectiveness of each project manager in carrying out his or her job responsibilities was measured on a rating scale using a nine response choice [36]. The respondents, of whom half were project managers and the other half were functional managers or other (see Appendix), were asked to mark the overall effectiveness of the project manager in their latest project. The overall effectiveness of each project manager, in carrying out his or her job responsibilities, in most of the projects in this study was well above average, ranking in the top 10%. In total 90% of projects were in the top 40%. Only 5% were seen as moderately below average in the bottom 25% and another 5% a little below average, in the bottom 40%.

There was a correlation (Spearman's ρ) (see Table 2) in this study between the leadership behavior of the project manager and the overall effectiveness rankings of the project manager. The correlation was the most significant in the planning/organizing, networking and conflict management/team building factors, and significant in the monitoring, informing, motivating/inspiring and developing factors. A correlation was found when integrating taxonomies of managerial behavior in making decisions, building relationships and giving-seeking information.

In analyzing (t-test for equality of means) the leadership behavior of project managers in this study (Table 2), the managerial practices of supporting and delegating were found to be significant ($p < 0.1$) with satisfaction tools. The managerial practice factors of planning/organizing, networking and informing were significant ($p < 0.1$) in terms of project success. In the grouped factors, giving-seeking information was significant ($p < 0.1$) for project success.

According to this study, it seems that planning/organizing, networking and informing are the most significant managerial practices in the leadership behavior of project managers. An integrating taxonomy – giving-seeking information – is the most significant.

Table 1
Issues, where conflicts are most likely to emerge in project management

	Ranking		
	This study	Posner	Thamhain and Wilemon
Schedules	3	1	1
Administrative procedures	7	7	5
Personality conflicts	4	6	7
Manpower resources (staffing)	1	4	3
Project priorities	5	3	2
Technical conflicts	6	5	4
Cost objectives	2	2	6

Table 2
Leadership behavior of project managers (summary)

Managerial practice	This study		Kim and Yukl (1995)		Taxonomy group this study[a]	Rank correlation between overall effectiveness of project manager and managerial practice
	Rating score	Rank	Managers rank	Subordinates rank		
Planning/organizing	4.50	1	12	11	1	0.837**
Problem solving	4.20	5	6	7	1	0.409
Monitoring	4.30	4	14	12	4	0.547*
Networking	3.90	10	13	7	3	0.580**
Informing	4.50	1	4	3	4	0.455*
Clarifying	4.50	1	8	6	4	0.189
Motivating/inspiring	4.00	7	9	10	2	0.474*
Conflict management/team building	4.00	7	1	2	3	0.573**
Supporting	4.10	6	2	1	3	0.273
Consulting	4.00	7	3	4	1	0.305
Recognizing	3.60	12	6	9	2	0.267
Developing	3.40	13	11	14	3	0.458*
Rewarding	3.00	14	5	13	2	0.330
Delegating	3.80	11	10	5	1	0.405
	Spearman rank correlation with this study					(2-tailed)
			0.011	0.342		
			Not significant (close to zero)	Positive but not significant		

[a] Integrating taxonomy of managerial behavior: 1 – making decisions, 2 – influencing people, 3 – building relatsionships, and 4 – giving-seeking information.
* $p < 0.05$.
** $p < 0.01$.

5. Summary and conclusions

The results of this study show that the organizational types most commonly used by the respondents were the functional matrix, the project matrix and the project team. Respondents were on average satisfied with the communication in the projects. Consistent with prior studies [2], this paper documents that the project team and the project matrix are rated as the most effective organizational forms of project management. The shift towards competitive global markets demands faster change and response from the subject organizations. Under these circumstances, the traditional functional organization is not the best structure. Traditional functional organizations have frequently had to form project teams to respond to rapidly changing market conditions.

Consistent with prior literature, the results concerning technical competency suggest that project management tools are widely used [10]. In this survey, project management tools were used in 75% of projects, i.e. slightly less than what had been found previously. This may at least partly be explained by the smaller average company size in this study. The *Microsoft Project* software was found to be the most popular tool in this survey and in some prior studies [9,10]. According to the respondents, project managers are reasonably satisfied with the currently available selection of project management tools according to this and the previous study [5]. According to this study and previous studies [7,8] people were dissatisfied because a good tool for the management of multi-projects was not available.

The reasons given for final project cost models not being used or only partly used were that the method was not known, or the projects were too small. This applies to the low use of the earned value method as well. According to prior studies [20], the earned value method is not so critical for the success of a project. Instead, the traditional methods of cost, time and recourse management are more important.

According to this study, it seems that planning/organizing, networking and informing are the most significant managerial practices in the leadership behavior of project managers. The overall findings of this paper imply that technical project management tools and methods are so developed and widely used that now it is time to turn the focus on developing leadership skills. The survey respondents in this study ranked the characteristics of an effective project manager as follows: (s)he must be able to communicate and inspire people to become motivated, and in addition (s)he must be decisive enough. These results support the previous results [35] that social science and small group research could be creditable for project management.

In conclusion, this paper provides a balance between theory and research and actual project management practices. The survey findings concerning the relative importance of project management tools and leadership requirements should be relevant to companies that are increasingly using projects in their daily work to achieve their goals. These findings can be used in further studies and also in practice to improve the effectiveness of project management. Further studies could corroborate the results

of this study for example in less project-oriented organizations, with more extensive data, and with different experience and knowledge levels of project managers.

Acknowledgments

Appendix

The company/organization size

Turnover in Meur	Number of companies
0–10	5
11–30	2
31–50	8
51–100	2
101–150	4
150>	4
	25

Employees number	Number of companies
10	2
10–99	3
100–499	6
500–999	8
1000–5000	5
5000 >	1
	25

Respondents background

Acting as	Number
Functional manager	8
Project manager	13
Other	4
	25

Position	Number
Top level	8
Middle level	13
Other level	4
	25

Years	Worked total	Project experience
0–5	3	8
6–10	4	6
11–20	7	6
21–30	7	4
31–35	4	1
	25	25

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Success of Projects in Different Organizational Conditions

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ABSTRACT

The main purpose of this study is to evaluate the critical success/failure factors in project management and to examine the relationships between critical success factors and organizational background variables. This study also aims to gain an understanding of how project clients, owners, and sponsors present their needs and expectations to ensure project success. On the basis of the survey responses received, it is possible to identify critical success factors in project management that are significantly related to company/organization size, project size, organization type, and project managers' work experience. The project implementation profile is also analyzed on average and by phases. The results indicate the importance of project communication that is related to company size, however. In contrast to some prior studies, communication was ranked highest in most project phases.

Keywords: managing projects; critical success/failure factors; project success; organizational variables

Introduction

There is a growing need for the management of projects in various business organizations. Increasingly, companies are now using projects in their daily work to achieve their goals. Surprisingly in the project management literature it is still somewhat unclear what makes a successful project in general, and, in particular, in the terms of organizational context of the company or companies involved. The concept of project success has not been well-defined anywhere in project management literature. Failure is also an imprecise and ill-defined term used by practitioners and in the literature, without deep meaning (Rae & Eden, 2002). Shenhar and Wideman (2000) concluded that there does not appear to be any agreed-upon understanding of the concept of success in either business or project management literature. Cooke-Davies (2002) also noted that decades of individual and collective efforts by project management researchers since the 1960s have not led to the discovery of a definitive set of factors leading to project success.

In recent years, researchers in project management have become increasingly interested in critical success/failure factors. Previous research results indicate that the relative importance of several of the critical factors changes significantly, based on life-cycle stages (Pinto & Prescott, 1988). Nevertheless, the success factors are usually listed in either very general terms, or very specific terms affecting only particular projects. Our knowledge and understanding of the critical success/failure factors, as well as of how to measure them and the interactions between these factors, have great importance for project management effectiveness (Belassi & Tukel, 1996).

There are still too many examples of projects exceeding their budgets, running late, or failing to meet other objectives. Numerous methods and techniques have been developed, and many examples exist of project management tools used for tracking the harder technical aspects of projects. However, there have been few attempts to find a tool to aid project tracking and control in relation to the softer human elements of project management (Pinto, 1990). However, additional future research concentrating on the relationship between critical success factors and measurement techniques and human elements in project management can be expected. It would seem to be of interest to give increased research attention to the behavior and organizational factors of project management (Hyväri, 2000; 2002; Zimmerer & Yasin, 1998).

This paper presents the results of a survey made in organizations among modern progressive companies. This study aims for new knowledge and understanding of project management and the critical success/failure factors in project management in an organizational context. On the basis of the findings it is possible to identify critical success/failure factors in project management in different organizational conditions and in different project phases. The paper is divided into the following parts. First, previous research is reviewed. Second, the results of the survey are presented and analyzed. These results are compared with previous results. Third, relationships are examined on the basis of this research. Finally, directions for future research are suggested.

Previous Studies

This research addressing the success of projects in different organizational conditions includes the following aspects of interest: (1) the organizational context in project management, (2) critical success factors in project management, and (3)) dependencies between these factors. The following review of previous research concerning these aspects provides a view of current knowledge and missing knowledge concerning project success in an organizational context.

Organizational structures ranging from the classic purely functional organization to the opposite end of the spectrum, the projectized organization, have been presented in *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* (PMI, 1996). In projectized organizations (or project teams) most of the organizational resources are involved in project work. Matrix organizations are a blend of functional and projectized organizations. Matrix organizations are defined by Gobeli and Larson (1987) as a functional, balanced, and project matrix. The *PMBOK® Guide* has named these matrix types as weak, balanced, and strong matrixes. Most modern organizations involve all these structures at various levels. Even a fundamentally functional organiza-

tion may create a special project team to handle a critical project.

Project managers interact continuously with upper-level management, perhaps more than with functional managers. The effectiveness of dealing with upper-level management has been presented by Kerzner (1990). The use of different types of organizations in project management has been examined by several authors (Chuad, Tummula, & Nkasu, 1995; Gray, Dworatschek, Gobeli, & Knoepfel, 1990; Turner, Utley, & Westbrook, 1998). Within organizations, companies have organized project offices that specialize in managing projects more effectively (Bridges & Crawford, 2000). The project office is an organization developed to support the project manager in carrying out his or her duties. Project office personnel must have the same dedication with respect to the project as the project manager and must have good working relationships with both the project and functional managers. The major responsibility of the project manager and the project office personnel is the integration of work across the functional lines of the organization. The project team is a combination of the project office and functional employees. On larger projects and even on some smaller investments it is often impossible to achieve project success without the help of permanently assigned personnel from the company and outside the company. Project management effectiveness refers to the success of the project. Both the success of the project and the career path of the project manager can depend upon the working relationships and expectations established with upper-level management (Kerzner).

There are only a few studies of human resource management in project management (Fabi & Pettersen, 1992). Only since the 1990s have researchers noticed the significance of the project group and team (Katzenbach & Smith, 1993; Williams, 1997), empowerment and organizational learning (Argyris, 1977; 1990; Ayas, 1996; Hammuda & Dulaimi, 1997; Pinto & Kharbanda, 1996;

Senge, 1990), and communication in project management. The focus of project risk management has turned from quantitative methods to the development of the risk management process and understanding in different project phases, and to the organizing of risk management (Artto, 1997; Chapman & Ward, 1997; Kähkönen, 1997). For the requirements of project managers, the *PMBOK® Guide* has been created and published. In addition, a certification process for project managers is in progress. Although cooperation and networks between companies have increased lately, research in this area is still rare (Guss, 1997; Hedberg, Dahlgren, Hansson, & Olve, 1997; Larson, 1995; Weston & Gibson, 1993). In prior studies, in the area of project management research, the project manager's leadership principles and duties have been examined (Zimmerer & Yasin, 1998). It has been concluded that organizational effectiveness requires project management to combine technical competency, i.e., tools, with the ability to develop and display leadership (Hyväri, 2000; 2002; Zimmerer & Yasin, 1998). The leadership factors in the success of projects, the factors contributing to making project management effective, and the characteristics of effective project managers were all examined by Zimmerer and Yasin (1998).

Project management literature has not defined unambiguous criteria for successful projects. On the basis of previous research in project management, critical success/failure factors in project phases and conflict situations have been reviewed (Adams & Barnt, 1978; Belassi & Tukel, 1996; Cleland & King, 1983; Honko, Prihti, & Virtanen, 1982; Pinto & Prescott, 1988; Pinto & Slevin, 1987; Schultz, Slevin, & Pinto, 1987). A survey of critical success/failure factors has also been carried out by dividing the factors into strategy and tactics. A few success/failure factors in the project process have been observed. The success factors are usually expressed as either very general factors or are very specific factors affecting only a particular project (Baker, Murphy, & Fischer, 1983; Cleland &

King, 1983; Finch 2003; Pinto & Slevin, 1987). The project implementation profile (PIP) was developed by Slevin and Pinto (1986; 1987) in an attempt to identify which aspects of a project determine success or failure. Its aim is to assist in identifying and measuring 10 critical success factors (CSFs) for a successful project outcome. This PIP was applied by Pinto (1990), Pinto and Prescott (1988), Dilisle and Thomas (2002), and Finch (2003), who applied PIP to an information systems project. Pinto and Prescott (1988) examined CSFs over the project life cycle. They found that the relative importance of several of the critical factors change significantly based on the life-cycle stages.

There is little research on dependencies between organizational context and CSFs in project management. Belassi and Tukel (1996) emphasized, in their summary of previous research, the importance of understanding the critical success/failure factors and how to measure them and the interactions between these factors. They grouped CSFs into five categories (project, project manager, project team, organization, and external environment).

In conclusion, the research review reveals that there is a gap in research of the success of projects in an organizational context. There is not enough knowledge about the dependencies between organizational context and CSFs in project management. There is also an evident need to understand priorities of different success factors in different project phases.

Purpose of this Study
This study examines the success factors of project management in organizations actively involved in projects and how the project clients, owners, and sponsors in organizations present their needs and expectations to ensure a successful project. The main purpose of this study is to evaluate the critical success/failure factors in project management and to examine their relationships with organizational background variables.

This study aims to make a contribution to a better understanding and improvement of the project management context in organizations. In this research, success and failure factors in projects are explored on the basis of previous studies. On the basis of the information received from respondents, these factors are prioritized and it is supposed that the most critical factors are those success/failure factors that are highly prioritized. CSFs are prioritized between different success factors and in different project phases. In addition, an examination has been made as to whether the results of previous studies support the results in this study. Critical factors in projects and in project management have also been examined by factor groups and, on that basis, the relationships between organizational variables have been studied.

Research Data and Methods
Empirical Data and Data Collection
The empirical data of this study is based on a survey sent to the members of the Project Management Association Finland in 2002. In this research the survey started with the question: "Aren't you interested in learning how projects and their management appear in your organization?" The survey included a great amount of data, gathered in response to 54 questions, including altogether about 400 sub-items. There were 14 open questions. The survey included questions on success/failure factors and the ways of handling conflicts. In addition, the survey included questions on the general background of the respondents, the projects, and the respondents' organizations, tools and leadership styles. People were asked to take part in the survey only if they had been actively involved in managing a project, and were asked to base their responses on their most recently concluded project, even if that project had been curtailed or abandoned. The survey focused on the perspective of the project client/owner/sponsor, and included projects carried out for their own purposes.

First, in order to test the validity of the questionnaire, it was sent on a pilot basis to five project managers in five organizations. Their responses were used to revise and improve the questionnaire. Then an e-mail enquiry was sent to 78 company members and 368 individual members, inviting them to participate in the project management survey. Thirty responses were received from respondents representing different business organizations. These respondents were then asked to participate in the actual survey, which was carried out between December 2002 and February 2003. Twenty-five responses were received and all the 54 questions were answered. The results were statistically analyzed for correlation and reliability, with the aim of deriving insights into various relevant factors. Although the final sample size is fairly small in an absolute sense, it is nevertheless comparable to some relevant prior studies (for example, Delisle and Thomas, 2002, use approximately 40-50 responses in their individual surveys), and in any case it can be considered representative of the profile of the company members of the Project Management Association Finland.

Research Method
The present survey study utilizes the results of previous qualitative, descriptive case studies (Hyväri, 2000; 2002) to avoid bias and errors attributable to the limitations of the survey. In addition, three interviews were conducted. The study made use of the chi-squared test statistic introduced by Karl Pearson (Agresti & Finlay, 1997, p. 255). The non-parametric chi-squared test is particularly appropriate here, because it is based on variables measured on nominal scales, which is the case in this study. Data from the survey was imported from Microsoft Excel to SPSS statistical software for analysis.

Survey Findings
Background Variables
The industry sector breakdown of respondents' organizations is in Figure 1. Telecommunications services, software and IT accounted for 32% of

the responses, the manufacturing sector and engineering and construction for 20% each, public administration and education for 12%, and others for 16%.

The company/organization size in terms of turnover is shown in Table 1 of descriptive statistics of the survey organizations. Most of the companies had an annual turnover of €31-50 million, while four companies had a turnover in excess of €150 million. The respondents' background information is shown in Tables 2-3. With regard to respondent backgrounds, 32% of the respondents identified themselves as top-level, 52% as middle-level and 16% as some other level. Most of the respondents were project managers with 19 years (on average) of employment and 12 years (on average) as a leader or member of a project team. During the previous 12 months, an average of 60% of their work effort in their organizations had been in project management (standard deviation 35.5). And they had participated in six projects on average (standard deviation 8.3).

The projects were classified into nine types on the basis of the responses (see Figure 2). IT/software and investment projects each accounted for 24% of respondents, while staff development/training and business change/reorganization projects each accounted for 12% of respondents.

R&D, business reallocation and engineering projects each accounted for 8% of respondents, and construction projects for 4% of respondents.

Half of the projects were over €1 million (the projects, which ranged in size from €0.02 million to €1,500 million, are categorized in Table 4). The average project duration was 18 months (the range was three months to 42 months). Twenty-one projects had up to 100 activities, while four had more than 100 activities. The project office and project team structures differ between organizations in this study. The number of persons involved in projects was on average 24 persons from their own organization, 14 from the client organization, 98 from the suppliers' organization, and four from other organizations. The highest participation in one project was 2,000 persons. When respondents were asked to select the organization type that best described their own organization, the responses were divided as follows: functional 8%, functional matrix 28%, balanced matrix 12%, project matrix 28%, and project team 24%. Matrix type organizations were the most common.

Respondents were also asked questions concerning project communication in their projects on a scale of 1-5 (5 is the highest rating). Projects usually had written procedures/practices

(project guidelines, project implementation plans or similar). Respondents usually understood their roles and responsibilities in the projects. They also got the information needed and had adequate access to people with the information necessary for them to perform their respective jobs. Respondents felt that they got accurate information. They also understood well enough what their supervisors and other project groups expected of them. All the responses were in the range 4.3 - 4.8.

Success/Failure Factors in Project Management

This section presents findings concerning critical success/failure factors in project management. The critical success/failure factors were grouped in factor groups, and could be used together with organizational background variables on projects, organizations, and respondents to form relationships. The importance rankings of CSFs are also presented according to the PIP (Pinto, 1990) on average and by project phases.

Respondents were asked to select the three factors in each factor group (related to the project, the project manager, the project team, the organization, and the environment) that they considered to be the most critical to the successful implementation of their project. The results are shown in Table 5. The success/failure factors originated from the studies of Belassi and Tukel (1996) and Hyväri (2000; 2002). The ranking is done according to the frequency of responses.

The three critical project-related factors in this study were clear goals/objectives, end-user commitment, and adequate funds/resources. In the study of White and Fortune (2002), the three CSFs mentioned most frequently by respondents (responses were received from 236 project managers) were clear goals/objectives, support from senior management, and adequate funds/resources. These results support the findings concerning critical success/failure factors in this study. The three factors chosen in this study were not listed on the questions given to
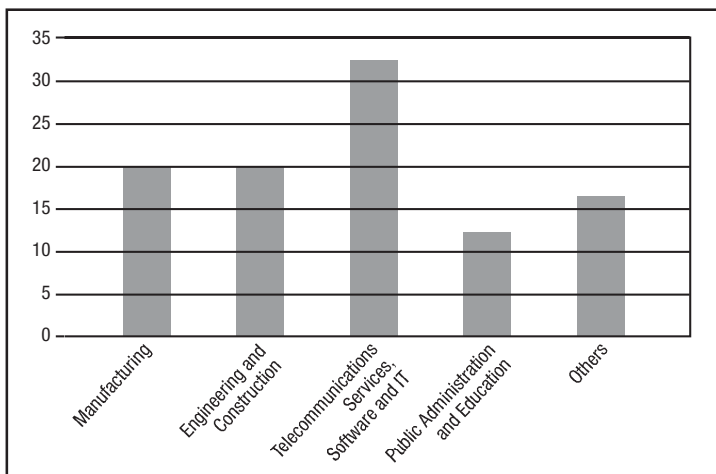

Figure 1: The industry sector breakdown of respondents' organizations (%)
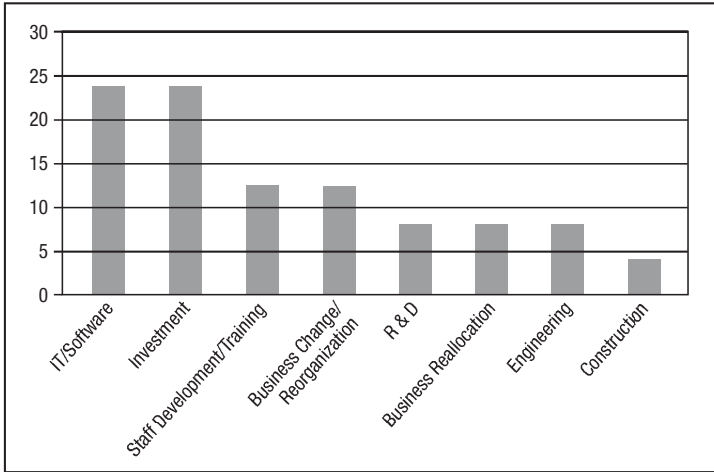
Figure 2: Project types on the basis of responses (%)

UR mill.	Number	Percent
0-17.5	6	24
>17.5-40	7	28
>40-111	6	24
>111-2200	6	24

Table 1: Company/organization size in turnover

Years	Number	Percent
0-11	8	32
>11-20	6	24
>20-29	6	24
>29-35	5	20

Table 2: Respondent's total work experience

Years	Number	Percent
0-5	7	28
>5-20	13	52
>20-32	5	20

Table 3: Respondent's work experience in projects

EUR mill.	Number	Percent
0-.25	7	28
>.25-1	6	24
>1-13.5	6	24
>13.5-1500	6	24

Table 4: Project size

respondents in the previous Belassi and Tukel (1996) study. They were listed in this study and were rated as the most important by respondents. In the study of Belassi and Tukel, 57 project managers ranked size and value, density, and urgency as the critical project-related factors.

The critical project-manager-related factors in this study were commitment, the ability to coordinate and effective leadership. In the study of Belassi and Tukel (1996), the critical project-manager-related factors were commitment, the ability to coordinate, and competence (the last was ranked fourth in this present study). In a separate questionnaire concerning leadership ability, the first three leadership characteristics of an effective project manager were being a good communicator, being a good motivator, and being decisive, while the next three were leadership by example, being visionary, and being technically competent. The characteristics of ineffective project management were mostly the opposite. The most important factors according to Zimmerer and Yasin (1998) were leadership by example, being visionary, and being technically competent. These factors were the next three characteristics of an effective project manager identified in this study. The most critical finding was that five of these six characteristics were managerial in nature. The technical competence factor was ranked only sixth in this study, whereas it had been third in the previous study.

The critical factors related to project team members were the same in this study as in the study of Belassi and Tukel (1996), namely communication, commitment, and technical background.

The critical factors related to the organization were ranked in the previous study (Belassi & Tukel, 1996) as organization structure, top management support, and functional managers' support. In the present study, top management support was the most important. The next two were clear organization/job descriptions (new in this study) and project

1. Factors related to the project	
Size and value	2
Having a clear boundary	4
Urgency	1
Uniqueness of the project activities	3
Density of the project network (in dependencies between activities)	4
Project life cycle	1
End-user commitment*	16
Adequate funds/resources*	15
Realistic schedule	9
Clear goals/objectives*	19
2. Factors related to the project manager/leadership	
Ability to delegate authority	5
Ability to trade-off	1
Ability to coordinate*	12
Perception of his or her role and responsibilities	3
Effective leadership*	9
Effective conflict resolution	2
Having relevant past experience	3
Management of changes	5
Contract management	1
Situational management	6
Competence	8
Commitment*	16
Trust	3
Other communication	1
3. Factors related to the project team members	
Technical background*	18
Communication*	22
Trouble shooting	4
Effective monitoring and feedback	7
Commitment*	23
Other scope known by members also	1
4. Factors related to the organization	
Steering committee	11
Clear organization/job descriptions*	17
Top management support*	21
Project organization structure*	12
Functional manager's support	9
Project champion	5
5. Factors related to the environment	
Competitors	5
Political environment	4
Economic environment	10
Social environment	7
Technological environment*	16
Nature	1
Client*	22
Subcontractors*	11
Note: Factors marked with an asterisk are further examined in Table 6.	

Table 5: Number of Success/Failure Factors

organization structure. They were followed by functional managers' support and steering committee. There was no remarkable difference in the present study compared to the previous study (Belassi & Tukel).

The critical factors related to the environment were the client, the technological environment, and the economic environment. The responses were the same in the present and previous studies, except that the present study also ranked subcontractors as highly as the client.

Preliminary Hypotheses on Relationships Between Project Success and Organizational Background Variables

The responses concerning critical success/failure factors (in Table 5) were used to identify relationships between these factors and the organizational background variables on projects, organizations, and respondents. The three most commonly selected factors in each group were identified for further analysis. There are a total of five groups and 15 factors. The hypotheses were used as a way of determining whether the background organizational variables on projects (see Tables 1-4), and on project type and organization type, was significantly related to success across the most CSFs (Table 5). The Pearson chi-square showed the factors that were significantly ($p < 0.1$) related to success.

The relationships were as follows: Company/organization size in terms of turnover (Table 1) had a significant relationship with communication. Communication in project teams was found to be a more significant critical factor in bigger companies/organizations than in smaller ones.

A significant relationship was found between project size in terms of millions of euros (Table 4) and adequate funds/resources. The significance was stronger in smaller projects. Another project size factor, the number of activities in each project (84% of projects in this study had fewer than 100 activities, while 16% had more than 100 activities), was also related to adequate funds/resources. A positive relationship was found with projects of fewer than 100 activities.

	End–User Commitment	Adequate Funds/ Resources	Communication	Clear Organization Job Description	Client	Subcontractor
Company/organization size(EUR mill.)			0.510 (0.033)			
Project size (EUR mill.)		0.576 (0.006)				
Project size (number of activities)		0.471 (0.008)			0.424 (0.019)	
Organization type						0.637 (0.002)
Project management total work experience	0.461 (0.081)			0.453 (0.091)		

Note: Table 6 reports contingency coefficients and related significance levels (in parentheses) between project success factors and background variables.

Table 6: Relationships with project critical success factors and organizational background variables

In terms of environmental factors, organization type had a relationship with the subcontractor and a weaker relationship with the client. The functional organization was negatively related to both of these environmental factors. Matrix organizations (functional, balanced, and project matrix) and project team organizations were positively related to the subcontractor factor and negatively related to the client factor. A negative relationship was also found between the client (as an environmental factor) and project size (in number of activities), mostly in smaller projects. The reason may be that most of the sample projects were company projects rather than client projects.

The total work experience of project managers (Table 2) was strongly related to the project factor, "end-user commitment." Project managers with longer work experience had a stronger connection with end-user commitment. A clear organization/job description was more significant for project respondents whose work experience was fewer than 11 years. A weaker relationship was found between respondents working in projects (Table 3 in the Appendix) and the project management/leadership factor, "commitment." A more significant relationship was found for those who were more experienced in projects. The conclusion could be that project managers with long experience get end-users committed, while younger project managers need clear organizations and job descriptions in order to manage project work.

No significant relationship was found between project type and critical success/failure factors. The relationships with critical success/failure factors are presented in Table 6.

Success Factors According to the Project Implementation Profile

The results of this study were also compared with the widely used PIP method to find out how the results of this study support the results of PIP. Table 7 presents the rankings of the importance of CSFs according to this study and previous studies in the PIP. In the ranking used in this study (1 being the most important and 10 being the least important), respondents ranked communication, client consultation, and client acceptance as the most important factors, as project managers in the IS project had done in the previous study of Finch (2003). These results support the findings in this study (in Table 6), because the relationships with project success factors and organizational background variables (in Table 6) were found to be communication, client, and end-user commitment. The results of this study and the previous study of Finch (2003) do not differ from each other as much as they differ from the studies of Delisle and Thomas (2002), Pinto and Slevin (1987) and Pinto and Prescott (1988).

The correlation in ranking between this study and Finch's study was significant at a Spearman's rho correlation coefficient (Agresti & Finlay, 1997, p. 277) of 0.609 at the 0.05 level. There was no significant correlation between this study and the studies of Delisle and Thomas, Pinto and Slevin, and Pinto and Prescott. The difference may be because, in the study of Delisle and Thomas, the respondents represent virtual projects, while in this study, the respondents represent different kinds of more traditional projects.

When we compare this study with the previous study of Pinto and Prescott (1988), and the study of Pinto and Slevin (1987), the most dramatic changes are that, in this study, communication was in the first position, while in the previous study it was in the sixth or ninth position. The importance of project mission dropped significantly, from first position in the studies of Pinto and Slevin, Delisle and Thomas, and Pinto and Prescott to sixth position in this study. Technical tasks, and monitoring and feedback were also much more lowly rated in this study than in the previous studies. Client consultation was highly rated in all these studies. In addition to different respondents and research periods (Pinto & Prescott and Pinto & Slevin results are based on survey data from the 1980s), one plausible explanation is attributable to different project types. For example, conventional construction projects count for only 4% in this study (see Figure 2), whereas they cover 44% of the projects examined by Pinto and Prescott (1988).

The CSFs were also ranked in the different project phases of the project life cycle (Table 7). The rank correlation analyses carried out in this study showed a strong relationship in factors

	This Study	Finch (PM) (2003)	Delisle & Thomas (2002)	Pinto & Prescott (1988)	Pinto & Slevin (1987)
A) Project mission	6	7	1	1	1
B) Top management support	4	6	9	7	2
C) Project schedule/plans	5	5	5	9	3
D) Client consultation	2	1	2	2	4
E) Personnel	9	10	10	10	5
F) Technical task	7	9	4	3	6
G) Client acceptance	3	4	6	4	7
H) Monitoring and feedback	10	3	3	5	8
I) Communication	1	2	8	6	9
J) Trouble-shooting	7	8	7	8	10

Note: Numbers in the above table indicate relative rankings of different factors in individual studies.

Project Implementation Profile by Phases

	Definition	Planning and Organizing	Implementation and Control	Closeout	
A) Project mission	1*	4*	10*	9*	
B) Top management support	5	5*	4	4	
C) Project schedule/plans	6	2	3*	7	
D) Client consultation	2*	3	8*	3*	
E) Personnel	8	7	6	10	
F) Technical task	7	6	6*	8*	
G) Client acceptance	4	8*	9	2	
H) Monitoring and feedback	10	10	4	5	
I) Communication	3	1	1	1	
J) Trouble-shooting	9	9	2*	6	

Note: Numbers in the above table indicate relative rankings of different factors by phases found in this study. Asterisks (*) indicate factors found important by Pinto & Prescott (1988).

Table 7: Project implementation profile

between the definition, planning, and organizing phases. On the other hand, the association was lightly negative in factors between the definition and implementation phases. Weaker positive correlation was found between the other phases.

There were differences in findings between this study and the previous study of Pinto and Prescott (1988). The CSFs varied from the averaged results over all project phases. The two most remarkable differences were in project mission and communication.

Project mission was a more important factor in the previous study, whereas it was the first factor only in the definition phase in this study. In Pinto and Prescott (1988) communication was hypothesized to be significant in the execution phase, but was eliminated during the ridge regression analysis. Pinto and Prescott (1988) confirmed that there is a relationship between communication and project success. In this study, communication was remarkable in all project phases being ranked number one on average. As

previously noted, these differences may be attributable to different respondents and research periods.

Discussion

This paper presents the results of a survey made in organizations among modern progressive companies. The present study utilizes the results of previous qualitative, descriptive case studies (Hyväri, 2000; 2002) to avoid bias and errors attributable to the limitations of the survey. In addition, three interviews were conducted. The

study made use of the chi-squared test statistic introduced by Karl Pearson (Agresti & Finlay, 1997, p. 255). However, the findings from the chi-square tests in this study should be interpreted with some caution, because the expected frequency did not exceed five in each cell (Agresti & Finlay, 1997, p. 258).

In this study respondents were asked to select and mark the three factors in each factor group (related to the project, the project manager, the project team, the organization, and the environment) that they considered to be the most critical to the successful implementation of their project. There was no remarkable difference between this study and the previous studies (Belassi & Tukel, 1996; White & Fortune, 2002) in terms of the listed factors. The three most commonly selected factors in each group were identified for further analysis. There were a total of five groups and 15 factors. The hypotheses were used as a way of determining whether the background variables on projects, organizations, and respondents were significantly related to the success of the project across the most CSFs.

The findings were as follows. Company/organization size was significantly related to communication in project teams. The latter was an even more significant factor in bigger companies/organizations. Project size (in terms of both millions of euros and number of activities) was related to adequate funds/resources, a relationship that was even stronger in smaller projects. In conclusion, project team communication is a more CSF for bigger companies, while adequacy of funds/resources is more critical for smaller companies.

The leadership section presented the characteristics of effective project management, with the survey results of this study being compared with previous studies (Zimmerer & Yasin, 1998). It was found that the most critical factors were managerial. All the evidence of recent research supports the idea that successful projects are led by individuals who possess not only a blend of technical and management knowl-edge, but also leadership skills that are internally compatible with the motivation of the project team and externally compatible with client focus strategies. As was apparent in the interviews of this study it is the talent and experience of project management that makes a project succeed or fail.

In terms of environmental factors, organization type had a relationship with the subcontractor and the client and was found to be critical. The functional organization had a negative relationship with both of these factors, while other organizations had a positive relationship with the subcontractor factor and a negative relationship with the client factor. Could the reason be that the functional organization is not able to respond quickly enough to the needs arising from environmental changes?

The total work experience of project managers was strongly related to the project factor, "end-user commitment," with the relationship becoming even stronger with longer experience. Younger project managers seem to need clearer project management organizations and job descriptions than older project managers do.

In terms of the PIP, it was remarkable to notice in this study that communication was ranked the highest in all project phases except the definition phase, where it was ranked third. Client consultation was ranked second or third in all phases except the implementation and control phase, where it was eighth. Client acceptance, on the other hand, was important in the definition and closeout phases, while troubleshooting was ranked highly in the implementation and control phase. Project mission was number one in the definition phase. The other findings are shown in Table 7. The relationships with project success factors and organizational background variables were also to found to be communication, client, and end-user commitment. These findings support the findings in this PIP study. The concept of project life cycle helps to clarify the reasons why different factors may be more important to project success at different times and in different phases.

Conclusion

This research points to the absence of empirical research about project success in different organizational conditions. This study has provided empirical evidence on the characteristics of the critical success/failure factors in project management in different organizational conditions. On the basis of the responses received, it is possible to identify CSFs in project management that are significantly related to company/organization size, project size, organization type, and project managers' work experience. The CSFs have also been ranked for the PIP, in terms of average rankings and by different phases. As a result of analyzing the results given in this study, project managers would be able to identify and eliminate the factors that have a negative effect on their performance. The results indicate the importance of project communication that is related to company size, however. In contrast to some prior studies, communication was ranked highest in most project phases.

Overall, the findings of this study suggest the need for further research in studying the role of effective communication in project management. In particular, further studies into the situation of specific knowledge and information management may open one potential avenue to increase effective communication that was found critical in most project management phases. As the results indicate, the organizational context, especially the size of the company, is an important factor to be considered.

A major part of the work of organizations is nowadays carried out in projects. The results of this study can be used in making project management systems and in assessing project management effectiveness. This study may well contribute to a better understanding and improvement of the project management context in organizations. This study offers new knowledge of how projects and project management appears to relate to different organizational conditions.

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APPENDIX:
SURVEY COVER LETTER AND QUESTIONNAIRE

SURVEY ON PROJECT MANAGEMENT
Please complete and return this Survey by December 20th, 2002

November 24th, 2002

Dear Colleague,

Aren't you interested in to learn how projects and their management appear in your organization?
This study is about this.

You have been selected from the membership of the Project Management Association Finland (Projektiyhdistys ry) to participate in this survey. This study will provide empirical evidence on project management. The aim of the study is to make a critical investigation of the balance between technical competency, i.e. tools, and leadership ability in different types of organization and in different kinds of projects. Another main purpose of this study is to evaluate critical success/failure factors in project management. The results are compared to previous research. The study may well contribute to a better understanding and improvement of project management practices in a project management context. This study will give you valuable benchmarking information. Your participation in this survey is very important to maximizing the validity of the results. The survey is a part of my doctoral thesis in the Helsinki School of Economics.

Please return your completed survey by **December 20th, 2002,** to: Irja Hyväri, Projektiyhdistys ry, PL 132, 02101 Espoo, or fax 09 461839, or e-mail: Irja.Hyvari@luukku.com. The survey form has been coded specifically to avoid troubling you with reminders once your survey has been returned. Please be assured that your responses will be maintained in strict confidentiality. The survey takes about an hour and half to fill.

Thank you for your participation in this study. The summary of results will be send to contributors. These results are planned to appear in professional publications.

With best regards,
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You are asked to take part in the survey only if you have actively been involved in the management of a project and base your responses on your most recently concluded project, even if that project has been curtailed or abandoned. This study is focused on the point of view of the project client/ owner/ sponsor, and where projects have been carried out for your own purposes. You may answer either in Finnish or in English.

Name of the company: _____

Your name and e-mail/ phone number: _____

Your job title (X):
❑ President   ❑ Director of Project Management   ❑ Project Manager
❑Vice President   ❑ Consultant   ❑ Project/ team member
❑ Professional   ❑ Other (specify)_____

Your position:
❑ top level   ❑ middle level   ❑ other level

Are you acting more as (X):
❑ a functional manager or   ❑ a project manager or ❑ other (specify)?_____

In what industries would most of your business be classified (X):
❑ Wholesale and retail   ❑ Telecommunication Services   ❑ Transportation and Communication
❑ Publishing/Distribution   ❑ Public Administration   ❑ Software Development/ It-Systems
❑ Manufacturing   ❑ Health   ❑ Information Technology
❑ Engineering   ❑ Defense/Aerospace   ❑ Research and Development
❑ Construction   ❑ Finance, Insurance and Banking ❑ Education
❑ Petrochemical   ❑ Electricity, Gas and Water   ❑ Other (specify)_____

Company/organization size, number of employees (X):
❑ less than 10   ❑ 10-99   ❑ 100-499
❑500-999   ❑ 1000-5000   ❑ 5000 plus

Turnover (Million Euro/latest year)_____
Is your company:
❑ European   ❑ USA   ❑ Other (specify)_____

How many years have you worked total? _____years
How many years of experience have you had as a member or leader of a project team? _____years
During the last 12 months, what percentage of your work effort has been project management? _____%.
During the last 12 months, in how many projects have you actively participated? _____projects

PROJECT

Size of your latest project? _____(in Million Euro)
Your latest project duration? _____(months)

Would most of your project have (X):❑less than or equal to 100 activities   ❑ more than 100 activities

DIFFERENT KINDS OF PROJECTS: In what kind of project have you worked lately (X)?
❑ Staff Development/Training ❑ IT/Software Development   ❑ Research and Development
❑ Investment   ❑ Engineering   ❑ Construction
❑ Defense   ❑ Business Reallocation   ❑ Business Change/Reorganization
❑ Other (specify)_____

Nature of the project: Are you working in a ❑ domestic project or ❑ international project?
Are you working in a partnership project? ❑ Yes ❑ No Why?_____
_____

What type of contract does your project have?
❑ fixed price   ❑ cost plus   ❑other _____
❑ remeasurement based on _____

Number of persons involved in the project from ❏ _____ (persons) from your organization
❏ _____   clients´ organization ❏ _____ suppliers´ organization   ❏ _____   other (name)

Identify the most important and the least important performance criteria for judging success in your project (from 5=the most important to 1=the least important, 5 levels):
1) On schedule ___   2) On budget ____   3) Technical success ___   4) Quality success ___   5) Meeting commercial parameters ___ 6) Client/customer satisfaction ___   7) Achieving the Project Goal ___ 8) Project Team Satisfaction ___   9) Others (specify)_____ .

Who controls the risk in your project: ❏ client   ❏ contractor
❏ both   ❏ other (name) _____

Do you have defined project management at:
❏ portfolio level   ❏ program level   ❏ project level
❏ other (name) _____

Name in rank order the most important information parameters in your project selection:
1) _____   2) _____   3) _____
4) _____   5) _____

What kind Balance Score Card measurements do you use in project management, if any? Name
1) _____   2) _____   3) _____
4) _____   5) _____

ORGANIZATION

DIFFERENT KINDS OF ORGANIZATION. Select the organization type that best describes your organization (definitions in Table 1 a-e):
❏ a) Functional Organization   ❏ b) Functional Matrix   ❏ c) Balanced Matrix
❏ d) Project Matrix   ❏ e) Project Team

Please present the ranking of the structures used in your organization (definitions in Table 1 a-e) (5=mostly used, 4=second, 1=least used). Organization type / ranking:
a)   b)   c)   d)   e)

Please rate the effectiveness of the different structures in your organization (5-1 scale, 5=most effective, 1=least effective): a)   b)   c)   d)   e)

Who makes the decisions in case of deviation during the project implementation:
❏ Project Manager   ❏ Project Board   ❏Portfolio Board
❏ Section Manager   ❏ Other (name) ?_____

Describe an event in your current job as a manager when you felt internally motivated during and satisfied at the conclusion of the situation. Please be as detailed as possible about the specific reasons and circumstances for the feelings _____
_____
_____

Describe an event in which you felt frustration during and dissatisfaction at the conclusion of the situation. Please be as detailed as possible about the specific reasons and circumstances for the feelings
_____
_____

Select which scenario best described your overall feelings concerning your job._____
_____

TOOLS, METHODS, METHODOLOGIES

Please indicate the approximate year in which you first used project management tools:
a) Manual tools (&methods)_____ b) computerized techniques (for ex. own Excel forms, Ms Project) _____.

On what percentage of projects have you used project management tools:
a) In the past 12 months _____ % b) two (2) years ago ____ % c) five (5) years ago____ % ?

For what purposes have you used project management tools in the past 12 months? (X all that apply to):
❑ project planning ❑ project control ❑ general work
planning/presentation ❑ other (specify) _____❑ Do not use such software

Please list as many as three project management tools you have used or are currently using. For this survey, an example of a project Management tool could be Microsoft Project.
Tool 1)_____ Tool 2)_____ Tool 3) _____

Please indicate the amount of time you use each tool, as a percentage of all project management tools you listed:
Tool 1 ___ % Tool 2 ____ % Tool 3____ %(Total 100 %).

Are you happy with these tools? ❑ Yes ❑ No. Please, specify
_____

Evaluation of models for forecasting the final cost of a project. What kind of model do you use?_____

Why are the Models for the Final Cost of a project not used or partly used?_____
_____

Usage of the Earned Value method for evaluating project performance in number of projects (X):
❑ 0-19% ❑20-49% ❑ 50-79% ❑80-99% ❑ 100%.
Why do you not use or partly use that method?_____
_____

Communication questions by category. *Please answer (scale 5=usually, 4=sometimes, 3=seldom, 2=never and 1= don't know).*

	Usually 5	sometimes 4	seldom 3	never 2	don't know 1
A) Does your projects have written procedures/practices for your work scope (project guidelines, project implementation plan or similar documents)?	❑	❑	❑	❑	❑
B) How well do you understand your roles and responsibilities in projects?	❑	❑	❑	❑	❑
C) How often you get the information needed?	❑	❑	❑	❑	❑
D) Do you feel you have adequate access to the people with the information necessary for you to perform your job?	❑	❑	❑	❑	❑
E) Do you get accurate information?	❑	❑	❑	❑	❑
F) How well do you understand what information your supervisor and other groups on this project expect from you?	❑	❑	❑	❑	❑

LEADERSHIP

What do you consider as the characteristics of effective project managers?

(By Zimmerer & Yasin)	Rank (10= the most important to 1=the last important)
1.Leadership by example	
2.Visionary	
3.Technically competent	
4.Decisive	
5.A good communicator	
6. good motivator	
7.Stands up to upper management when necessary	
8.Supportive of team members	
9.Encourages new ideas	
10.Other/others-specify	
11.	

What factors contribute to ineffectiveness among project managers? (List and rank)

Factors	Rank (10= the most important to 1=the last Important)
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

In what issues are conflicts most likely to emerge in project management (scale from 1 indicating low intensity or frequency to 5 indicating considerable intensity or frequency)?
a) Schedules _____   e) project priorities _____
b) administrative procedures _____   f) technical conflicts _____
c) personality conflicts _____   g) costs objectives _____
d) manpower resources (staffing) _____   h) other (specify) _____.

What conflict management styles do you (your project managers) typically use (scale 5 mostly used to 1 least used)? Conflict management styles see Table 2.

	Mostly used 5	Often used 4	Medium used 3	Seldom used 2	Least used 1
1) Confronting or Problem Solving or Collaborating	❑	❑	❑	❑	❑
2) Compromising	❑	❑	❑	❑	❑
3) Smoothing or Accommodating	❑	❑	❑	❑	❑
4) Forcing or Dominating	❑	❑	❑	❑	❑
5) Withdrawing or Avoiding	❑	❑	❑	❑	❑

SUCCESS/FAILURE FACTORS

Please mark (by X) three (3) factors from each factors group that you consider to be the most important factors for the successful implementation of your project. Note that if your factors are not listed below; please add them to the areas provided. (Belassi & Tukel, Hyväri)

1) Factors related to the project. Select 3 (three) factors and mark (by X)).

The size and the value	❑
Having a clear boundary	❑
Urgency	❑
Uniqueness of the project activities	❑
Density of the project network	
(in dependencies between activities)	❑
Project life cycle	❑
End user commitment	❑
Adequate funds/resources	❑
Realistic schedule	❑
Clear goals/objectives	❑
Other (specify)	❑

2) Factors related to the project manager/leadership. Select 3 (three) factors and mark (by X)).

Ability to delegate authority	❑
Ability to trade-off	❑
Ability to coordinate	❑
Perception of his/her role and	
responsibilities	❑
Effective leadership	❑
Effective conflict resolution	❑
Having relevant past experience	❑
Management of changes	❑
Contract management	❑
Situational management	❑
Competence	❑
Commitment	❑
Trust	❑
Other (specify)	❑

2)   3) Factors related to the project team members. Select 3 (three) factors and mark (by X)).

Technical background	❑
Communication	❑
Trouble shooting	❑
Effective monitoring and feedback	❑
Commitment	❑
Other (specify)	❑

4) Factors related to the organization. Select 3 (three) factors and mark (by X)).

Steering committee	❑
Clear organization/job descriptions	❑
Top management support	❑
Project organization structure	❑
Functional manager's support	❑
Project champion	❑
Other (specify)	❑

5) Factors related to the environment. Select 3 (three) factors and mark (by X)).

	Competitors	❑
	Political environment	❑
	Economic environment	❑
	Social environment	❑
	Technological environment	❑
	Nature	❑
	Client	❑
	Subcontractors	❑
	Other (specify)	❑

How does the intensity of critical success factors appear in your project over the project life cycle (scale from 1 indicating low intensity or frequency to 5 indicating considerable intensity or frequency, zero (0) indicates no effect)? The critical success factors are identified on the basis of the Project Implementation Profile (PIP) (further specified in Table 3. at the end of this inquiry)

	Definition Rank (scale 5-1, 0)	Planning and organizing Rank (scale 5-1, 0)	Implementation and control Rank (scale 5-1, 0)	Close-out Rank (scale 5-1, 0)
A) Project mission				
B) Top management support				
C) Project Schedule/plans				
C) Client consultation				
D) Personnel				
E) Technical task				
F) Client acceptance				
G) Monitoring and feedback				
H) Communication				
I) Trouble-shooting				
J) Other (name)				
	Definition Rank (5-1)	Planning and organizing Rank (5-1)	Implementation and control Rank (5-1)	Close-out Rank (5-1)
In what phases are conflicts most likely to emerge (scale from 1 indicating low intensity or frequency to 5 indicating considerable intensity or frequency)				

Was your latest project successful? ❑ Yes ❑ No If it was successful, name the main reasons for that:_____

_____

 Was your latest project unsuccessful? ❑ Yes ❑No If it was unsuccessful, name the main reasons for that: _____

_____

LEADERSHIP BEHAVIOUR OF PROJECT MANAGER

Please describe and scale leadership behavior of the project manager in your latest project. In scale (usually…never, don't know) Items more specified in Table 4.

	Usually, In a great entent	Sometimes, In a moderate extent	Seldom, In a limited extent	Never, Not at all	Don't know, Not applicable
1. PLANNING/ORGANIZING	❑	❑	❑	❑	❑
2. PROBLEM SOLVING	❑	❑	❑	❑	❑
3. MONITORING	❑	❑	❑	❑	❑
4. NETWORKING	❑	❑	❑	❑	❑
5. INFORMING	❑	❑	❑	❑	❑
6. CLARIFYING	❑	❑	❑	❑	❑
7. MOTIVATING/INSPIRING	❑	❑	❑	❑	❑
8. CONFLICT MANAGEMENT/ TEAM BUILDING	❑	❑	❑	❑	❑
9. SUPPORTING	❑	❑	❑	❑	❑
10. CONSULTING	❑	❑	❑	❑	❑
11. RECOGNICING	❑	❑	❑	❑	❑
12. DEVELOPING	❑	❑	❑	❑	❑
13. REWARDING	❑	❑	❑	❑	❑
14. DELEGATING	❑	❑	❑	❑	❑

Please mark (by X) the overall effectiveness of the project manager in your latest project
1. The least effective manager I have known;   ❑
2. Well below average, in the bottom 10 %;   ❑
3. Moderately below average, in the bottom 25 %;   ❑
4. A little below average, in the bottom 40 %;   ❑
5. About average in effectiveness;   ❑
6. A little above average, in the top 40 %;   ❑
7. Moderately above average, in the top 25 %;   ❑
8. Well above average, in the top 10; or   ❑
9. The most effective manager I have ever known.   ❑

Table 1
Description of Project Organization Structures (Gobeli & Larson & al.)

a) Functional Organization
The project is divided into segments and assigned to relevant functional areas and/or groups within functional areas. The project is often coordinated by functional and upper levels of management.

b) Functional Matrix
Project managers are formally designated to oversee the project across different functional areas. They have limited authority over functional people involved and serve primarily to plan and coordinate the project. Functional managers retain primary responsibility for their specific segments of the project.

c) Balanced Matrix
Project managers are assigned to oversee the project and interact on an equal basis with functional managers. Project managers and the functional managers jointly plan and direct workflow segments and approve technical and operational decisions.

d) Project Matrix
Project managers are assigned to plan, direct and oversee the project and are responsible for the completion of the project. Functional managers' involvement is limited to assigning personnel as needed and providing advisory expertise.

e) Project Team
A manager is put in charge of a project team composed of a core group of personnel from several functions assigned on a full-time basis. The functional managers have no formal involvement.

Table 2
Five General Modes for Handling Conflict (Blake & Mouton, Thamhain & Wilemon, Posner)

1) Confronting or Problem Solving or Collaborating
Involves a rational problem-solving approach. Disputing parties solve differences by focusing on the issues, looking at alternative approaches, and selecting the best alternative. Confronting may contain elements of other modes such as compromising and smoothing.

2) Compromising
Bargaining and searching for solutions which bring some degree of satisfaction to the parties involved in conflict. Since compromise yields less than optimum results, the project manager must weigh such actions against program goals.

3) Smoothing or Accommodating
Emphasizes common areas of agreement and de-emphasizes areas of difference. Like withdrawing, smoothing may not address the real issues in a disagreement. Smoothing is a more effective mode, however, because identifying areas of agreement may more clearly focus on areas of disagreement; and further, project work can often continue in areas where there is agreement by the parties.

4) Forcing or Dominating
Exerting one's viewpoint at the expense of another – characterized by competitiveness and win/lose behavior. Forcing is often used as a last resort by project managers since it may cause resentment and deterioration of the work climate.

5) Withdrawing or Avoiding
Retreating from a conflict issue. Here, the project manager does not deal with the disagreement. He may ignore it entirely, he may withdraw out of fear, he may feel inadequate to bring about an effective resolution, or he may want to avoid rocking the boat. If the issue or disagreement is important to the other party, withdrawal may intensify the conflict situation. In some cases, a project manager may elect to use the withdrawing mode as either a temporary strategy to allow the other party to cool off or as a strategy to buy time so that he can study the issue further.

Table 3

Project Implementation Profile (PIP). 7 scale critical success factor definitions (Pinto)

Project Mission
Initial clarity of goals and general directions
Top management support
Willingness of top management to provide the necessary resources and authority/power for project success.
Project Schedule/plans
A detailed specification of the individual action steps required for project implementation.
Client consultation
Communication, consultation, and active listening to all impacted parties.
Personnel
Recruitment, selection and training of the necessary personnel for the project team
Technical task
Availability of the required technology and expertise to accomplish the specific technical action steps.
Client acceptance
The act of "selling" the final project to its ultimate intended users.
Monitoring and feedback
Timely provision of comprehensive control information at each stage in the implementation process.
Communication
The provision of an appropriate network and necessary data to all key actors in the project implementation.
Trouble-shooting
Ability to handle unexpected crises and deviations from plan.

Table 4.

Definitions of Managerial Behaviors (Yukl, 1994, 2002)

PLANNING/ ORGANIZING. Determining long-term objectives and strategies, allocating recourses according to priorities, determining how to use personnel and resources efficiently to accomplish a task or project, and determining how to improve coordination, productivity and effectiveness.

PROBLEM SOLVING. Identifying work-related problems, analyzing problems in a systematic but timely manner to determine causes and final solutions, and acting decisively to implement solutions and resolve crises.

MONITORING. Gathering information about work activities and external conditions affecting the work, checking on the progress and quality of work, and evaluating the performance of individuals and effectiveness of the organizational unit.

NETWORKING. Socializing informally, developing contacts with people who are a source of information and support, and maintaining contacts thought periodic visits, telephone calls correspondence, and attendance in meetings and social events.

INFORMING. Disseminating relevant information about decisions, plans and activities to people who need the information to do their work.

CLARIFYING. Assigning work, providing direction in how to do the work, and communicating a clear understanding of job responsibilities, task objectives, priorities, deadlines, and performance expectations.

MOTIVATING/ INSPIRING. Using influence techniques that appeal to logic or emotion to generate enthusiasm for the work, commitment to task objectives, and compliance with request for cooperation, recourses, or assistance; also, setting an example of proper behavior.

CONFLICT MANAGEMENT/ TEAM BUILDING. Facilitating the constructive resolution of conflict and encouraging cooperation, teamwork, and identification with the organization unit.

SUPPORTING. Acting friendly and considerate, being patient and helpful and showing sympathy and support when someone is upset or anxious.

CONSULTING. Checking with people before making changes that affect them, encouraging participation in decision making, and allowing others to influence decision.

RECOGNICING. Providing praise and recognition for effective performance, significant achievements, and special contributions.

DEVELOPING. Providing career counseling and doing things to facilitate someone's skill development and career advancement.

REWARDING. Providing tangible rewards such as a pay increase or promotion for effective performance and demonstrated competence.

DELEGATING. Allowing others to have substantial responsibility and discretion in carrying out work activities and giving them authority to make important decisions.

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