PROJECT MANAGERS' PERCEPTION OF IS PROJECT SUCCESS FACTORS – A REPERTORY GRID INVESTIGATION

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Abstract

The success of Information Systems (IS) projects is of great relevance in IS research and practice. However, scholars barely agree on a definite set of IS project success factors. In order to gain insights into such success factors, we conducted an empirical qualitative study. We interviewed eleven experienced project managers concerning the factors which have influenced the success of their IS projects. In the data collection, we used the Repertory Grid Technique and extended it by 'Laddering'. Having collected a total of 78 unique factors from the interviews, we applied content analysis to categorize the factors and arrange the emerging 19 categories hierarchically in a causal map via cognitive mapping. We contribute to developing a list of IS project success factors.

Keywords: information systems, project management, success factors, repertory grid.

1 Introduction

The success of Information Systems (IS) projects is of great relevance in IS research and practice. Further, it is generally acknowledged that there is a high percentage of problematic projects in IS practice (Agarwal and Rathod, 2006; Kendra and Taplin, 2004; Nelson, 2005).

Whereas factors contributing to the success of IS projects are frequently discussed (Kendra and Taplin, 2004; Nelson, 2007; Procaccino et al., 2005a), it seems that not only does the research community still lack agreement regarding the relevant factors (Belassi and Tukel, 1996; Hyväri, 2006), also the transfer of academically gained insights to practitioners leaves room for improvement.

Many success factor lists developed in literature are theoretically based and neglect interactions between the factors (Belassi and Tukel 1996). Comparatively little effort has been done to empirically elicit success factors from practitioners from scratch. Therefore, in this paper, we aim at gaining insights into practitioners' experience regarding the success factors of IS projects and their interactions.

We hope to contribute to developing a list of project success factors by exploring the mindset of project managers. Different from prior works pursuing different research methodologies (e.g., Mitchell, 2006; Yetton et al., 2000), we apply cognitive mapping and therefore ex-ante do not provide any particular definitions of project success or project success factors.

The remainder of the paper is organized as follows. In Section 2, we address prior research on success factors in the general project management and IS project management. In Section 3, we outline our research design; and in Section 4, we present our results including a causal map showing the relevant factors found. We discuss the results in Section 5 and conclude with a brief summary and outlook in Section 6.

2 IS Project Success Factors in the Literature

Kerzner (2006) defines a project as a series of multi-functional activities and tasks that have a specific objective to be completed within certain specifications, defined start and end dates, funding limits, and consume human and non-human resources. Project success is typically assessed based on several dimensions and is driven by success factors (Baccarini, 1999; Collins and Baccarini, 2004; Cooke-Davies, 2002; Mueller and Turner, 2007; Poon and Wagner, 2001). For a discussion of success dimensions we refer to Agarwal and Rathod, 2006; Aladwani, 2002a; Karlsen et al., 2005; Pinto, 2004. We will not dig deeper into this extensive body of literature, as - in this paper - we only investigate success factors (purposefully without predefining the project success or its dimensions).

Regarding the success factors literature, we differentiate two major streams and see three sub-streams in the second one. A first stream of literature identifies and groups success factors in general projects. A second stream identifies and groups success factors in IS projects; here we distinguish three sub-streams, one that identifies and groups success factors in IS projects, one that empirically analyzes the impact of pre-selected success factors on IS projects, and a third one that empirically investigates IS project success factors from a specific stakeholder perspective.

2.1 Identifying and grouping success factors in general projects

Belassi and Tukel (1996) distinguish factors related to the project (size and value of a project, uniqueness of project activities, and the urgency of a project outcome), to the project manager and the team members (project manager's and team members' skills), to the organization (top management support), and to the external environment (political, economic, and social factors). Similarly, Cooke-Davies (2002) differentiates factors leading to the success of project management (traditionally measured against adherence to planning) and factors leading to the success of a project as a whole

(measured against the overall objectives of the project including the benefits the stakeholders expected to achieve with the project). Also Baccarini (1999), Nelson (2005), and Thomas and Fernandez (2008) distinguish between project management success and project success. Along those lines, Hyväri (2006) enhances her observation that the project management literature lacks a clear set of project success factors with a claim for the importance of communication in project teams as one of the most relevant success factors.

2.2 Identifying and grouping success factors in IS projects

Considering the second literature stream that refers to success factors in IS projects, we prefer to group selected works in three sub-streams.

Identifying and grouping success factors in IS projects. Based on their empirical works, Kendra and Taplin (2004) distinguish four categories of success factors, namely project manager skills and competencies, performance measurement systems, organizational structures at the project level, and supporting management practices. Reel (1999) differentiates five factors for successful software projects: start on the right foot, maintain momentum, track progress, make smart decisions, and institutionalize post-mortem analyses. Aladwani (2002a) looks at technology characteristics, project characteristics, task characteristics, people characteristics, organizational characteristics, and work processes. Yetton et al. (2000) highlight the importance of team dynamics, risk management, senior management support for strategic projects, and user participation. Dutta and Lee (1999) investigate related areas of best practices and find organizational and management practices, standards and procedures, metrics, control of the development process, and tools and technology to be relevant. Similarly, Nelson (2007) derives ten best practices for IS project management including agile development, joint application development, and staged delivery. Whereas those studies relate to rather general IS project success factors, Verner and Evanco (2005) focus exclusively on in-house software development, Holland and Light (1999) concentrate on ERP projects, Rainer and Watson (1995) on executive IS, and Biehl (2007) on global IS. Cerpa and Verner (2009), Gemino et al. (2007), Schmidt et al. (2001) discuss risks in IS development projects rather than success factors.

Empirically analyzing the impact of pre-selected success factors on IS projects. This sub-stream empirically investigates the impact of specific pre-selected success factors; we point to some selected works. Chatzoglou (1997) provides evidence of the positive effect of applying developing methodologies on the quality of the end product and the economics of the development process. Abdel-Hamid et al. (1999) investigate the impact of different project goals on project performance. Jiang et al. (2001) show that planning maturity contributes to project success. Aladwani (2002b) examines how social integration positively impacts the success of IS projects. Jiang et al. (2006) stress that user partnering significantly relates to higher user support, less residual risk, and ultimately better project performance. Sharma and Yetton (2007) provide empirical support for the effect of (end-user) training on IS project success. Young and Jordan (2008) analyze top management support. Petter (2008) investigates the management of user expectations. Thomas and Fernandez (2008) focus on a formal definition and measurement of IS project success which actually contributes to the success itself. Tiwana and Keil (2009) investigate the effect of control mechanisms in internal and outsourced IS projects. Napier et al. (2009) investigate skill requirements for successful IT project managers with the Repertory Grid Technique (same research method as we use in our study). Subramanian et al. (2009) focus on the aspects of learning, control, efficiency, and flexibility, identifying potential for improvement in those areas. Conboy (2010) examines the budgetary control in IS projects.

Empirically investigating IS project success factors from a specific stakeholder perspective. Yet another set of studies stresses the need to differentiate among the understandings of various stakeholders and to give special weights to the specific executive or practitioner perspective with regard to the success factors of IS projects (Procaccino et al., 2005a). Doherty and King (2001) investigate the view of senior IS executives and find that IS executives perceive organizational issues to be more important than technical ones. Procaccino et al. (2005b) underline that practitioners

(software developers, including programmers, data base developers, systems analysts, etc., however excluding project managers) consider IS projects successful if they – the practitioners – have been intrinsically motivated to develop systems that in their perception meet user needs and are easy to use. Verner et al. (2007) explore the effect of schedule estimation practices and their implications for software project success from the perspective of software developers.

Whereas this stream investigates stakeholders' different views regarding IS project success factors, those works do not examine IS project success factors as seen and weighted by project managers. This is where we aim to contribute to the existing rich literature on success factors of IS projects.

3 Research Approach: Data Collection and Method of Analysis

In order to identify and categorize IS project success factors as perceived and weighted by project managers, we undertook an empirical qualitative study among experienced IS project managers.

3.1 Data Collection

We conducted eleven semi-structured interviews among experienced IS project managers using *Repertory Grid Technique (RGT)* (Tan and Hunter, 2002) extended by Laddering (Rugg et al., 2002).

RGT is a cognitive mapping technique based on the personal construct theory (Kelly, 1955). RGT assumes that all people see the world in form of bipolar and hierarchically related constructs such as physical properties (color), character traits (kindliness), or – in this case – project success factors. It explores how participants construct their world compared to other survey instruments where researchers mainly seek to confirm what the researcher understands (Curtis et al., 2008). RGT focuses on the respondent and his experience and thus minimizes the researcher's bias. RGT has been widely used in IS research. Tan and Gallupe (2006) recently applied it for examining business and IT thinking; Napier et al. (2009) used it to explore the skills of successful IT project managers; and Siau et al. (2010) took advantage of RGT when investigating characteristics of the team members. Tan and Hunter (2002) offer a comprehensive discussion of design decisions to be taken when employing RGT.

In addition, we used Laddering to gather additional information based on the mentioned factors. We applied Upwards Laddering to the positive pole of the factor by asking a question like "How does this positive pole contribute to project success?" and Downwards Laddering by asking "Could you give me some examples of / elaborate the positive pole?"

We interviewed eleven project managers, two female and nine male, in three different companies. They had an average of 46.2 projects and 14.3 years of IS development experience. Every project manager named at least four completed IS development projects containing all typical developing phases and commissioned by a contractor. He ranked the projects with regard to their success. We then first chose the most and the least successful projects for comparison: this allowed us an 'easy' start with many factors for the first pair of projects. We asked "Projects can differ in various factors which contribute to project success, for example human, organizational, technical, methodical factors, or general conditions. In terms of what such factor do these two projects differ from one another with regard to project success?" Following the method of cognitive mapping, we purposefully did not define any key constructs ahead of time, looking for the success factors as they emerged from the practitioners' responses.

Then, we treated every identified factor in three ways. Firstly, we asked whether the factor was clear in context. For example, if the respondent named 'High motivation', we asked whose motivation was meant. Secondly, we applied Upwards Laddering which often yielded further factors on higher hierarchical levels. Thirdly, we applied Downwards Laddering to ensure that every factor was sufficiently refined. We repeated the procedure until no further factors emerged. At the end of the

interview, we asked the interviewee to review the gained set of factors and to approve it as an appropriate representation of his understanding. After the interviews, we sent all transcripts to the interviewees for verification. Two interviewees made slight changes concerning single words. All but one perceived RGT to be a pleasant and motivating questioning technique.

3.2 Method of Analysis

We applied a Data Driven Content Analysis (Jankowicz, 2004) to categorize the collected data. To enhance reliability, two analysts (interviewer plus one) conducted the content analysis. First, we collected all available information for each mentioned factor (raw factor) including the laddering answers. We then categorized all raw factors following the generic content-analysis procedure (Jankowicz, 2004). This step included reviewing each factor and deciding whether it fits into one of already developed categories or a new category needed to be created (with or without changes to the existent categories). Factors which did not fit into any category were grouped under 'Miscellaneous'. We again analyzed the laddering statements to identify the relations between factors and illustrated those relations as arrows in a causal map. We gained further factors from the laddering statements (laddering factors) and added them based on the described categorization procedure. Single laddering factors formed a category (laddering category) as soon as several different respondents mentioned them. We reviewed the raw factors and consolidated them into unique factors, partially renamed to capture the meanings of all summarized raw factors. Based on the number of incoming and outgoing arrows for every category, we arranged the categories as hierarchically as possible. Categories with many outgoing and few incoming relations were moved to the bottom of the map and vice versa. The total number of arrows for each category points to the importance of the categories.

4 Results

Table 1 shows the identified categories along with the numbers of raw and unique factors, incoming and outgoing relations, and different respondents who mentioned at least one factor (either raw or laddering factor) in the according categories.

Several categories (1, 3, 9, and 10) do not contain any raw factors; they emerged from laddering answers only. For instance, no respondent mentioned 'Efficiency of project performance' (category 1) as a raw factor, but five respondents mentioned it by elaborating on the relations between raw factors and project success. In terms of semantics, the term 'team members' does not include the project manager unless stated otherwise. The term 'project' refers to both team members and project manager.

In Figure 1, we provide the resulting causal map. The thickness of an arrow represents the number of times the respondents mentioned a particular relation. For completeness, we also show the success dimensions in the box of 'IS Project Success' as they were mentioned in the interviews; however, as pointed out above, they are not part of our study per se.

Beside the category 'General Conditions', the categories 'Systematic Approach' and 'Team Members' Qualification' have the most outgoing relations and were mentioned by nine out of eleven and seven out of eleven experts, respectively. The categories 'Team Members' Motivation' and 'Planning, Monitoring, Controls' have a lot of incoming relations (24/16), they were mentioned by every respondent. We conclude that most project managers consider these categories and the respective success factors important.

	Category	Definition/Description	# raw factors	# unique factors	# incoming relations	# outgoing relations	# different respondents
1	Efficiency of Project Performance	Ratio of objective achievement to expended effort	Laddering Category		14	11	6
2	Relationship Client – Contractor	Factors concerning relationship between client and contractor (including top management)	20	14	5	15	8
3	Assuring Product Quality	Common quality assurance activities (generation and execution of test cases)	Laddering Category		3	3	2
4	Safety in Project	Factors concerning handling of project risks	1	1	9	4	5
5	Relationship Management–Project	Factors concerning relationship between contractor top management and project team incl. project manager	6	3	7	10	6
6	Team Members' Motivation	Factors concerning team members' personal and project-related motivation during project	7	2	24	13	11
7	Team Members' Qualification	Factors concerning team members' skills and expertise	11	6	1	20	7
8	Right Mix of Team Members	Factors concerning composition of project team (e.g., gender, age)	11	5	1	5	5
9	Team Members' Responsibility	Team members' responsibility in project	Laddering Category		2	1	1
10	Team Members' Focus on Project	Team members are focused on project / not distracted by tasks in other projects or conflicts with colleagues	Laddering Category		3	3	3
11	Management of Team Members' Expectations	Dialogue about team members' expectations and handling these expectations by project manager	2	1	2	2	3
12	Clear Objective	Clearly defined project objective including time, budget, and functional requirements	10	5	1	13	7
13	Transparency in Project	To what extent team members incl. project manager are informed about project plan, status and all events important to them	2	1	7	8	3
14	Communication in Project	Factors concerning communication between team members incl. project manager	5	3	7	12	8
15	Planning, Monitoring, Controls	Factors regarding project planning, monitoring, and controls	8	5	16	11	11
16	Systematic Approach	Methodological approaches applied in contractor's projects (knowledge management, configuration management); basic structuring approaches (e.g., definitions of responsibilities)	19	7	1	23	9
17	Project Manager's Characteristics	Various project manager characteristics (e.g., leadership skills)	8	5	0	13	4
18	General Conditions	Conditions not affected by project manager (e.g., availability of resources, project size)	13	9	0	26	6
19	Miscellaneous	Factors not fitting into any other category	13	11	9	16	8
Total			**136**	**78**	**112**	**209**	

Table 1. Identified Categories

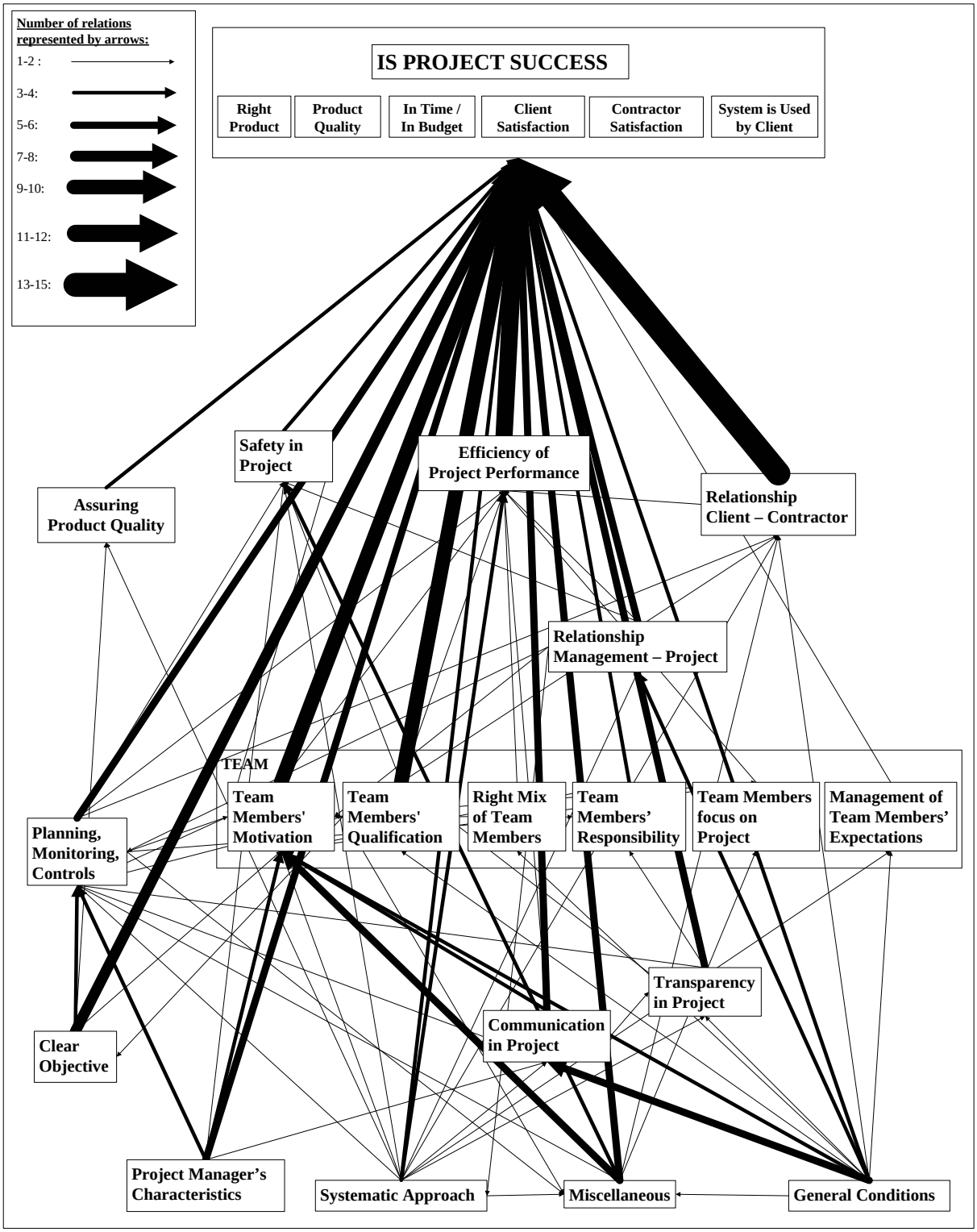

Figure 1. Hierarchical Illustration of Developed Categories

Eight out of eleven respondents mentioned the category 'Relationship Client – Contractor' (Figure 2). The category contains the most factors and has the strongest outgoing relation. Therefore, we choose it here as an example category for further description and analysis.

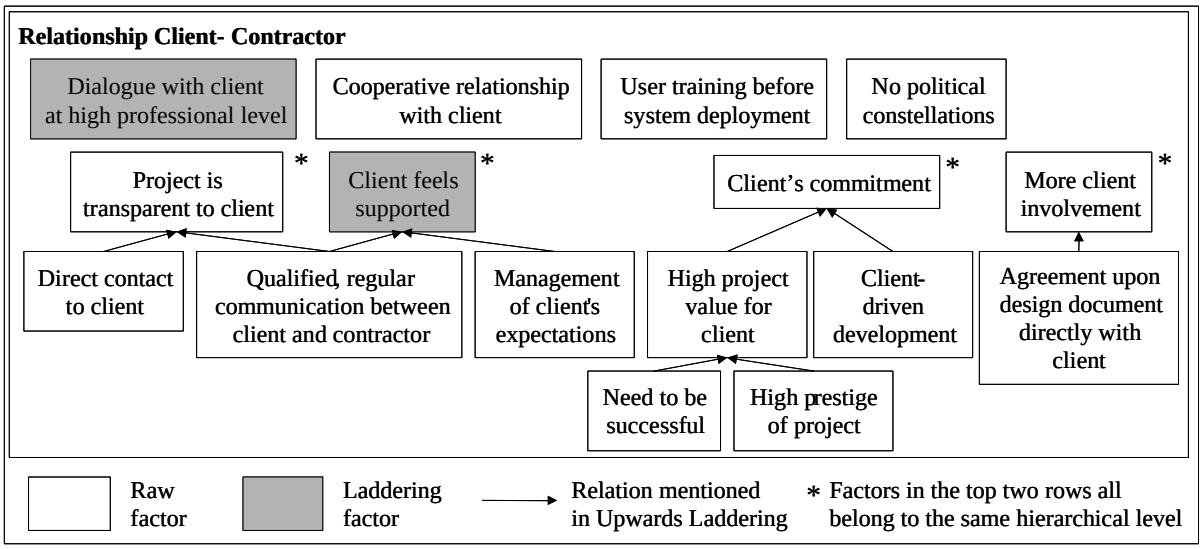

Figure 2. Category 'Relationship Client – Contractor'.

We have eight factors on the top level within the category (top two rows). In the following, we describe them and their contributing factors.

- 'Dialogue with client at high professional level' is a laddering factor. Interviewees mentioned it as a positive consequence of the team members knowing client's systems and processes. Being able to communicate with the client at a high professional level leads to higher client satisfaction and therefore higher project success from the perspective of project managers.
- 'Cooperative relationship with client' implies a relationship of trust, where cooperation between contractor and client is most important (contrary to both parties trying to protect themselves).
- 'User training before system deployment' not only includes trainings for end-users how to use the system, but also deals with uncertainties of how the new system affects their work; they reduce the end-users' resistance to the developed system.
- 'No political constellations' refers to the absence of any hidden, unwanted project objectives which would contribute to project failure.
- 'Project is transparent to client', both a raw and a laddering factor, describes that the client is informed about all relevant project events. 'Direct contact to client' (absence of any intermediate beings) and 'Qualified, regular communication between client and contractor' (including the quality of the communication and of the communication channel as well as the frequency of the communication) contribute to 'Project is transparent to client'.
- 'Client feels supported', which, in turn, increases client's satisfaction and therefore project success, is based on 'Management of client's expectations' (defined by one of the respondents as the process of alignment of client's expectations with the reality – what outcome can really be achieved and when) and 'Qualified, regular communication between client and contractor'.
- 'Client's commitment', mentioned six times, is explained by the contributing factors 'High project value for client' and 'Client-driven development'. A high value project is critical for an organization's survival ('Need to be successful') or is of ('High prestige of project'). Elaborating on 'Client-driven development', one respondent described how a customer did not want to commission a project but was forced to do so due to legal regulations. As a result, the customer was not committed to the project and could not be satisfied. The project manager considered that project a failure even though it was completed within time and budget constraints and according to specified requirements.
- 'More client involvement' refers to client involvement in project events. 'Agreement upon design document directly with client' improves the client's understanding of relevant documents. One

respondent mentioned a case where the client was not involved in preparing the design document but rather approved it afterwards without understanding it fully.

5 Discussion

Admittedly, the sample of eleven respondents does not allow for statistical statements; we only provide first insights into the success factors of IS project as perceived by IS project managers. Nevertheless, it is worthwhile to compare our results to the literature on IS success factors.

As to be expected, in some instances the groupings of factors differ. For example, we cover the importance of top management support in the category 'Relationship Management – Project', whereas Young and Jordan (2008) highlight it as a stand-alone factor. Or, we subsume several factors under 'General Conditions' which Belassi and Tukel (1996) list individually.

However, as regards the relevance of success factors, our research into the managers' perceptions often confirms existing findings. For instance, we confirm the importance of three key strategies for successful management (Petter, 2008): user involvement (category 'Relationship Client – Contractor'), trust (category 'Miscellaneous'), and project manager's leadership (category 'Project Manager's Characteristics'). Further, we substantiate the role of communication (Hyväri, 2006). We separated communication within the contractor organization (category 'Communication in Project') from communication between client and contractor (category 'Relationship Client – Contractor') in order to highlight different impacts of these types of communication. According to the project managers, better communication in a project contributes to the project being in time and in budget and better communication between client and contractor also increases the client's satisfaction. In addition, we support conducting user trainings before system deployment (see also Sharma and Yetton, 2007).

Different from numerous authors such as Reel (1999), Aladwani (2002a), Kendra and Taplin (2004), and Nelson (2007), we highlight the importance of the factors in the category 'Relationship Client – Contractor'. Those factors mainly affect the client's satisfaction, which – in turn – plays an important role in project managers' perception of success. Whereas project managers can barely influence 'No political constellations' and 'Clients commitment', awareness and readily available countermeasures would be beneficial. Finally, we reveal that 'Efficiency of Project Performance' is an important factor and have not found this insight in the literature.

Overall, our findings belong to the third sub-stream of literature works concerning IS project success factors seen from a specific stakeholder perspective (see Section 2). We also investigate IS project success factors from a stakeholder group's perspective as we empirically explore the view of IS project managers via cognitive mapping. Our research design is especially similar to the approach taken by Napier et al. (2009), who also apply the Repertory Grid Technique extended by Laddering. However, whereas Napier et al. (2009) concentrate on project managers' skills and competencies and investigate factors in this particular area, we elicit IS project success factors in general. Further, we pay attention to the interactions between success factors by means of Laddering, shown in our hierarchical map of factors. This may explain that we find 'Efficiency of Project Performance' as success factor via Laddering, although it was not mentioned in prior works. Our rather specific approach may have also influenced the factors we find in the category 'Relationship Client – Contractor'. As we did not constrain respondents by any definition of project success, we assume that project managers also took into account those aspects of success which are rarely included in pre-definitions such as client satisfaction. This is different from studies conducted by Mitchell (2006) or Yetton et al. (2000), where the project success is ex-ante defined according to specific dimensions such as being on time or in budget.

6 Summary and Outlook

In this exploratory, qualitative empirical study, we elicited – from project managers' perspectives – success factors of IS projects. We grouped the success factors in categories and arranged them hierarchically. The resulting causal map provides indications of possible constellations concerning success factors of IS projects and confirms many insights from earlier studies, such as the importance of management of user expectations (Petter, 2008) and the role of communication (Hyväri, 2006).

The sample of only eleven respondents does not allow for any statistical interpretations of the elicited factors or the hierarchical structure, that is, how the success factors interact with each other. Further, in spite of trying via eMail and via telephone, we could not confront our respondents with the results for validation. Hence, generalizability is clearly limited.

However, the content analysis procedure does not require validation from the respondents (Jankowicz, 2004) as it focuses on analyzing subjective insights from interviewees. Accordingly, we did not base our investigation on existing lists of IS project success factors nor on pre-chosen theoretical grounds. We tried to eliminate most subjectivity from our analysis phase by involving two independent analysts in every step.

As regards future works, we suggest two major paths: either one may want to reiterate our study using the same research approach interviewing more or differently sampled IS project managers. Similarly, one could investigate more homogeneous projects, for instance, one could focus on projects developing application, system, or embedded software or on projects with specific underlying contract types such as fixed-price versus pay-per-hour arrangements. Further, one may want to compare our findings drawn from project managers' perspectives with insights to be gained from a similar investigation of clients' perception of IS project success.

We pursue yet another path of future research: we take the findings gained from exploratory work as the basis for theory development and subsequent theory testing. Such endeavor requires developing propositions with ex-ante, clearly operationalized variables from our causal map and then using large-scale positivistic statistics for testing. Admittedly, various issues around control variables have surfaced during the stage of pre-testing our questionnaire. However, we hope that our causal map triggers several research activities along those lines and thus at least indirectly contributes to a growing body of IS literature.

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