Project Managers' Perceptions of IS Project Success Criteria – A Repertory Grid and Laddering Investigation

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ABSTRACT

The traditional approach to assess information system (IS) project success is adherence to planning (ATP) – meeting budget, schedule, and requirements. Today, scholars agree that ATP is insufficient to adequately assess IS project success, but an agreed-on set of success criteria is still missing. Many works on this topic are based on theoretical considerations rather than empirical inquiries. We analyze practitioners' perspective by investigating which criteria IS project managers consider relevant for IS project success assessment. We interview eleven experienced project managers in Germany, applying Repertory Grid and laddering to minimize potential biases. Our results yield eight success criteria, indicating that criteria like process efficiency and stakeholder satisfaction must be considered beside ATP. Scholars can use our findings applying the identified success criteria in future studies. Practitioners gain insights into the expert perspective on project success and might rethink the way of assessing success in their projects.

Keywords

Information systems, project success criteria, repertory grid, laddering.

INTRODUCTION

Assessing information system project success (ISPS) has a long research tradition (e.g., Atkinson, 1999; Baker, Murphy and Fisher, 1988; Ika, 2009). ISPS is typically assessed by evaluating a project's adherence to planning (ATP), that is, its adherence to budget, adherence to schedule, and conformance with specified requirements (Agarwal and Rathod, 2006; Atkinson, 1999; Ika, 2009; Judgev and Müller, 2005). ATP (also called iron triangle or triple constraint) is the predominant approach to assess ISPS in organizations (Joosten, Basten and Mellis, in press; Thomas and Fernández, 2008) and to measure ISPS in success reports (e.g., Sauer and Cuthbertson, 2003; The Standish Group International, 2009).

However, many authors question whether ATP is sufficient to measure ISPS (e.g., Agarwal and Rathod, 2006; Atkinson, 1999; Judgev and Müller, 2005; Pinto, 2004; Shenhar, Dvir, Levy and Maltz, 2001) for numerous reasons (cf. *Theoretical Background*). Accordingly, scholars propose additional criteria like process efficiency (Baccarini, 1999; Thomas and Fernández, 2008) and stakeholder satisfaction (Baccarini, 1999; Karlsen, Andersen, Birkely and Ødegård, 2005).

Despite a substantial body of research, there is no agreed-on set of ISPS criteria. One reason for this disagreement is said to be that success is a matter of perspective (e.g., Ika, 2009). Another reason might be that the proposed criteria are in many cases derived from theoretical considerations (e.g., Aladwani, 2002; Atkinson, 1999; Baccarini, 1999; Baker et al., 1988; Pinto, 2004) rather than from analyzing practitioners' perspective. Whereas theoretical considerations are essential, a substantiated approach to derive success criteria should also incorporate practitioners' expert knowledge. We aim to analyze practitioners' perspective and focus on one particular stakeholder group, information system (IS) project managers, as they have deep insights into projects and are directly involved in success evaluation. Considering that the traditional success assessment using ATP emerged from a project management perspective, we investigate whether project managers themselves consider this approach sufficient to measure success; if not, other stakeholders are likely not to do so as well. We thus formulate our research question as follows:

Which criteria do IS project managers consider relevant for ISPS assessment?

We conduct an empirical qualitative study among experienced IS project managers. Simply asking practitioners which success criteria they consider relevant bears the risk that respondents are influenced by current success evaluation regulations in their organizations and refer to the status quo instead of their desired state. Therefore, we applied a knowledge-eliciting technique called repertory grid (henceforth: RepGrid) (Tan and Hunter, 2002) and its extension, the so-called laddering (Rugg, Eva, Mahmood, Rehman, Andrews and Davies, 2002). RepGrid has been shown to elicit personal knowledge while

minimizing researcher bias, and laddering allows for investigating aspects in question without asking for them directly. The latter advantage is important to counteract a possible status-quo bias.

We contribute to research and practice by providing in-depth insights to success perceptions of IS project managers which might concur, contradict, or complement existing considerations of ISPS criteria. Researchers can use our results by applying the identified success criteria in future studies (e.g., investigating ISPS rates). Practitioners gain insights into the expert perspective and might rethink their ISPS assessments. We provide a new perspective to this widely explored research domain by applying suitable knowledge-eliciting techniques in an innovative manner.

The remainder of this paper is structured as follows. Next, we provide theoretical background on ISPS measurement and fundamentals of RepGrid and laddering. Subsequently, we describe our research approach explaining the design of RepGrid and laddering in our context. Afterwards, we present and discuss our results. We conclude with implications and an outlook on future research.

THEORETICAL BACKGROUND

IS Project Success

A project in general is "a temporary endeavor undertaken to create a unique product, service, or result" (Project Management Institute, 2008, p. 5). Information systems "can be defined technically as a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization" (Laudon and Laudon, 2009, p. 46). An IS project can thus be seen as a temporary and unique endeavor to develop, extend, or adapt an IS.

As (IS) projects are typically defined with regard to cost, schedule, and requirements (Nicholas and Steyn, 2012, p. 4), their success is traditionally assessed in terms of ATP, that is, adherence to budget, adherence to schedule, and conformance with specified requirements (Atkinson, 1999; Baccarini, 1999). While agreement exists concerning adherence to budget and schedule, there seems to be disunity regarding conformance to requirements. First, there is a variety of denotations for it. Examples include requirements (Nelson, 2005), quality (Atkinson, 1999), performance (Pinto, 2004), scope (Agarwal and Rathod, 2006), and specification (Wateridge, 1998). Second, some authors explicitly differentiate between meeting functional and non-functional requirements (e.g., Agarwal and Rathod, 2006). Functional requirements represent features of a developed product whereas non-functional requirements are quality requirements like usability (Joosten et al., in press).

Furthermore, numerous authors strongly question ATP's sufficiency as sole criterion to measure ISPS (e.g., Agarwal and Rathod, 2006; Atkinson, 1999; Judgev and Müller, 2005; Pinto, 2004; Shenhar et al., 2001). First, ATP does not account for long-term customer benefits (Agarwal and Rathod, 2006; Atkinson, 1999). Projects initiated for profit reasons should be assessed according to related criteria (Shenhar et al., 2001). Second, estimates underlying project plans are often inaccurate (Basten and Mellis, 2011) due to lack of methods to adequately estimate budget and schedule (Agarwal and Rathod, 2006). Third, project plans are often biased due to negotiations or political actions (Lederer, Mirani, Neo, Pollard, Prasad and Ramamurthy, 1990). Finally, project success is seen as matter of perspective (Ika, 2009) and ATP probably does not suit all stakeholders' perspectives. Consequently, a variety of further criteria have been proposed. Examples include process efficiency (e.g., Baccarini, 1999; Thomas and Fernández, 2008) and stakeholder satisfaction (e.g., Baccarini, 1999; Karlsen et al., 2005). While agreeing on the multi-dimensionality of ISPS (e.g., Agarwal and Rathod, 2006; Aladwani, 2002) and on the importance of ATP as part of it, researchers lack mutual understanding of the complete picture of ISPS (illustrated in Figure 1).

Process efficiency has at times been equated with ATP (Aladwani, 2002; Shenhar et al., 2001). We emphasize that this equalization is inadequate. For instance, a project can be performed highly efficiently but still not meet its plans if they were unrealistic in the first place. Scholars argue that effort estimates underlying project plans are often incorrect (Basten and Mellis, 2011) due to a lack of reliable estimation methods (Agarwal and Rathod, 2006). Additionally, empirical findings confirm the difference between ATP and process efficiency (Basten, Joosten and Mellis, 2012).

The satisfaction of various stakeholders is another commonly proposed success criterion. Common stakeholder groups include the customer (as organization), end-users, contractor (as organization), and project team (Baker et al., 1988; Joosten et al., in press). Here again, no agreement regarding the role of stakeholders' satisfaction prevails in research. For instance, Nelson (2005) equals the satisfaction of all stakeholders to project success, whereas Baccarini (1999) considers stakeholder satisfaction to be among other sub-criteria of project success. Yet others particularly emphasize the importance of customer satisfaction (DeCotiis and Dyer, 1977; Pankratz and Loebbecke, 2011).

Another interesting aspect refers to the point in time of ISPS assessment (Baccarini, 1999; Ika, 2009; Pinto and Slevin, 1988). Whereas assessments directly after project completion are required for implications (e.g., evaluation of project manager),

other criteria are only evaluable in later stages of the information system's life cycle (e.g., end-user system acceptance, cf. Kwak, Park, Chung and Ghosh, 2012). Therefore, considerations whether or not to include such criteria in project success assessment depend not only on the criteria's content but also on the point in time of the assessment.

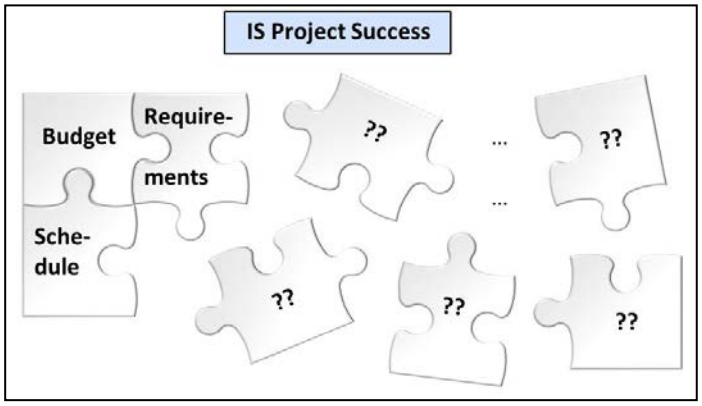

Figure 1: Incomplete Puzzle of ISPS Criteria

We contribute to existing research and shed light on the described puzzle of ISPS by taking an innovative empirical perspective. Using RepGrid and laddering, we investigate IS project managers' perceptions of ISPS criteria and hope to gain valuable insights while minimizing researcher and status-quo bias.

Repertory Grid Technique and Laddering

RepGrid is an interview technique based on the personal construct theory (PCT), both developed by the clinical psychologist George Kelly (1955). Kelly claims that everyone has a mental model of reality and uses it to interpret events and make decisions. This subjective model of an objective reality consists of elements and constructs. Originated in the clinical setting, elements in Kelly's PCT were people; however, depending on study purpose and context, elements can be any objects of people's thoughts like items, functional departments, or IS projects (Smith, 1986). Constructs are elements' qualities which people use to differentiate among elements, for example human qualities like kindness or evaluating qualities like usefulness (Smith, 1986). Constructs are hierarchically related to each other – the personal construct system of each individual is a unique hierarchical structure of super- and subordinate constructs. Furthermore, Fransella, Bell and Bannister (2004, p. 3) stress that constructs are not to be equated with their verbal labels. Constructs exist in people's minds whereas their labels are means to describe and communicate constructs. This distinction is crucial as different people often put the same labels on different things and vice versa. Shaw and Gaines (1989) distinguish between four possible semantic constellations: Consensus (same terminology for same concepts), correspondence (different terminology for same concepts), conflict (same terminology for different concepts), and contrast (different terminology for different concepts). Being aware of potential semantic ambiguities and addressing them adequately (e.g., by laddering, see below) is crucial for the validity of a qualitative study. A comprehensive description of PCT can be found in Kelly (1955) or Fransella et al. (2004).

RepGrid was developed by Kelly (1955) to explore people's personal construct systems. In qualitative studies like ours, it consists of comparing elements and identifying similarities and/or differences between them to elicit constructs. To this end, several design alternatives exist. Applying the method of triads for instance, the researcher selects three elements and asks the respondent to think of a characteristic in which two of them are similar but different from the third. With dyads, two elements are compared and the respondent identifies a difference between them. Whereas Kelly's original method of triads was based on his theory how constructs are first formed, Fransella et al. (2004, p. 28) argue that there is no reason to use three elements when eliciting constructs that are already established in one's personal construct system. Triads are more cognitively exhausting and should be used with care in complex domains. RepGrid is advantageous as it explores how participants construct their model of reality while other survey instruments mostly seek to confirm what the researcher assumes (Curtis, Wells, Lowry and Higbee, 2008). Moreover, RepGrid focuses on the respondents and their experience, thus minimizing researcher bias. An extensive overview of numerous design alternatives of RepGrid and according applications is given in Tan and Hunter (2002).

Laddering is an extension to RepGrid, developed by Hinkle (1965) to account for the hierarchical relations between personal constructs. Applying laddering, the interviewer asks additional questions regarding each identified construct and can move in different directions; among others (Rugg et al., 2002):

- Upwards, eliciting information about higher-level constructs (by asking questions like "Why would you prefer X?")
- Downwards, eliciting explanations and more refined information ("How could you tell that something was X?" or "Can you give me examples of X?")

Upwards laddering uncovers underlying hierarchical relations between constructs and quickly leads to top-level constructs (personal core beliefs of the respondents), whereas downwards laddering counteracts potential semantic ambiguities by clarifying meaning. Both upwards and downwards laddering are crucial for our inquiry as described below.

RESEARCH DESIGN

We interviewed eleven experienced IS project managers, two females and nine males. Our respondents worked in IT service departments of three large German organizations in the following industries: Logistics, IT consulting, and insurance. Interviews were recorded and transcribed afterwards. All respondents worked on application development projects on behalf of the contractor, with an average of 14.3 years in IS development. We investigated their subjective views on relevant ISPS criteria. To counteract the above-mentioned status-quo bias, we chose an indirect approach by starting with project success *factors* and deriving success *criteria* in the process. Whereas success *criteria* are measures by which success is judged, success *factors* are aspects contributing to project success (Cooke-Davies, 2002). We applied RepGrid and laddering to derive criteria as follows (cf. also Figure 2).

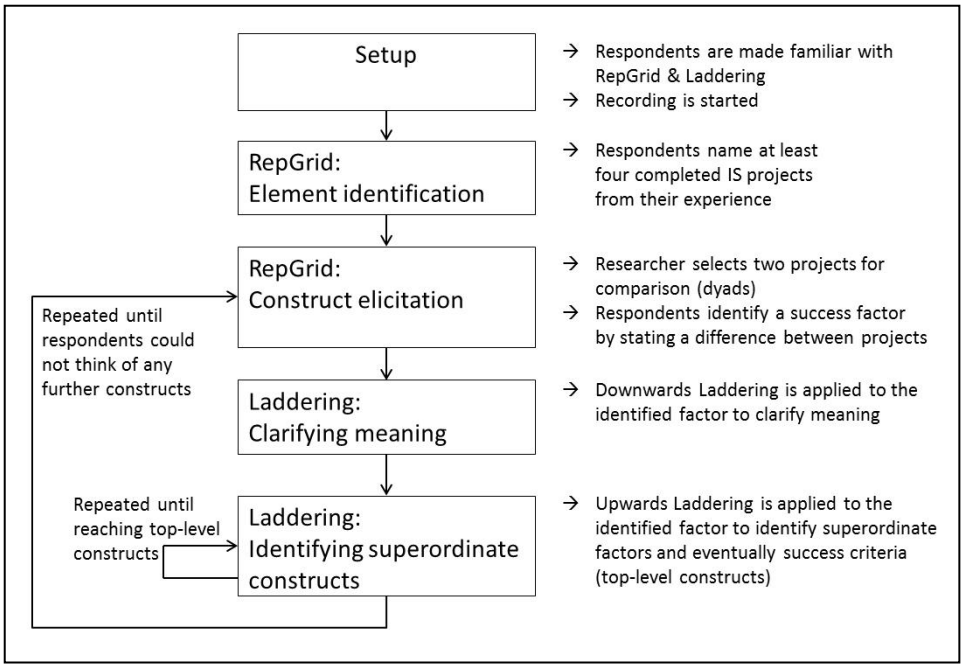

Figure 2: Interview Methodology

Each project manager named at least four of her/his completed IS projects that were commissioned by a customer. We chose the method of dyads (two projects) for project comparison as we consider project management to be a complex and cognitively challenging domain. We identified project success *factors* by asking: "Projects can differ in various factors which contribute to project success, for example, human, organizational, technical, methodical factors, general conditions, etc. In terms of what such factor do these two projects differ?" We clarified that our respondents were not restricted to any particular area and should mention any factor considered relevant. Once a factor was identified, we used downwards laddering to ensure a clear understanding. We then applied upwards laddering by asking "Why does this factor contribute to project success?" This question yielded hierarchically superordinate constructs, which were used as basis for upwards laddering

again. We iterated until top-level constructs (direct sub-constructs of project success and personal core constructs of our respondents) were reached, that is, until respondents answered along the lines of "…this factor leads to X, which in my opinion constitutes success". In doing so, we identified ISPS criteria (X in above example) without asking for them directly, thus avoiding status-quo bias. This approach resulted in numerous ladders from original constructs to project success.

We repeated this procedure until respondents could not think of further constructs (as starting points of new ladders). Afterwards, we sent all transcripts to the interviewees to ensure communicative validity. Two respondents made slight changes concerning single words. All but one perceived RepGrid to be a pleasant questioning technique. Subsequently, two researchers (interviewer plus one) analyzed collected data aiming to identify ISPS criteria. The following example (cf. Figure 3) illustrates the crucial role of laddering in our approach. Several respondents named expertise of contractor's team members to be a success factor. Downwards laddering revealed that different respondents used this terminology for different types of expertise (cf. "conflict" in the description of semantic constellations in *Theoretical Background*). One kind of expertise referred to developers' general programming skills and another to their familiarity with customer's existing systems (e.g., from earlier releases). Upwards laddering revealed that the first kind of expertise contributed to meeting time, budget, and requirements (ATP, top-level construct). The second, however, raised the quality level of communicating with the customer, which in turn led to higher customer satisfaction (top-level construct). Thus, we identified the success criteria ATP and customer satisfaction from these two ladders.

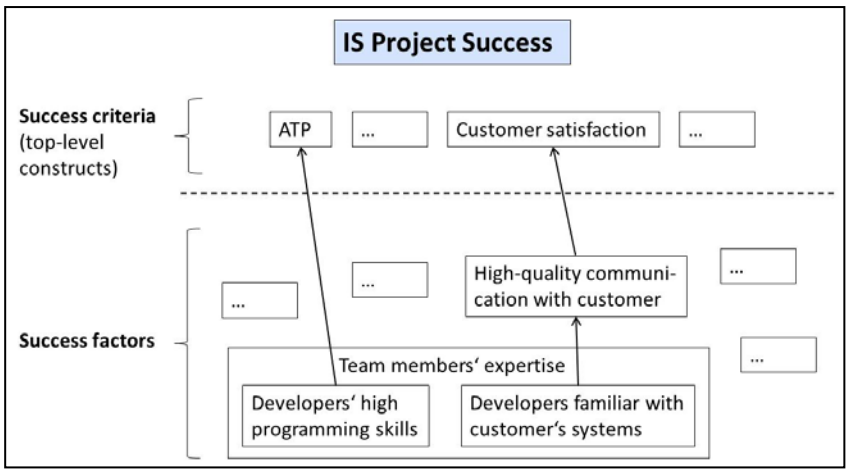

Figure 3: Laddering Example

RESULTS

In total, our approach yielded eight ISPS criteria. They are listed in Table 1 along with their definition, number of different respondents who mentioned them, and overall frequency of occurrence (respondents often mentioned same criteria in different ladders). The first four are the traditional ATP criteria. We separated meeting functional and non-functional requirements as these criteria were frequently stated in different ladders. Overall, ATP criteria were mentioned frequently and by many respondents. Process efficiency was stated as an independent aspect (from ATP) fourteen times and by six different respondents. The following two criteria reflect the satisfaction of the customer and contractor organization, respectively. The former was mentioned by seven different respondents and even more frequently than meeting functional requirements. The last criterion, stated once by three respondents, indicates whether the developed system is actually used at the customer organization.

	Success criterion	Definition	Number of respondents	Frequency of occurence
1	Adherence to budget	Conformance between planned and actual development cost	11	46
2	Adherence to schedule	Conformance between planned and actual development time	11	46

3	Meeting functional requirements	Conformance between specified functional requirements and their actual realization	7	22
4	Meeting non-functional requirements	Conformance between specified non-functional requirements and their actual realization	10	26
5	Process efficiency	Ratio of objective achievement to expended effort (budget, particularly human resources)	6	14
6	Customer satisfaction	Customer organization's stakeholders are satisfied with the project	7	23
7	Contractor satisfaction	Contractor organization's stakeholders are satisfied with the project	4	6
8	System is used by customer	Developed system is deployed and used by end-users after project completion	3	3

Table 1. Identified ISPS Criteria

Accordingly, from our eleven project managers' perspective, the metaphorical puzzle of ISPS criteria (cf. also *Theoretical Background*) looks like illustrated in Figure 4.

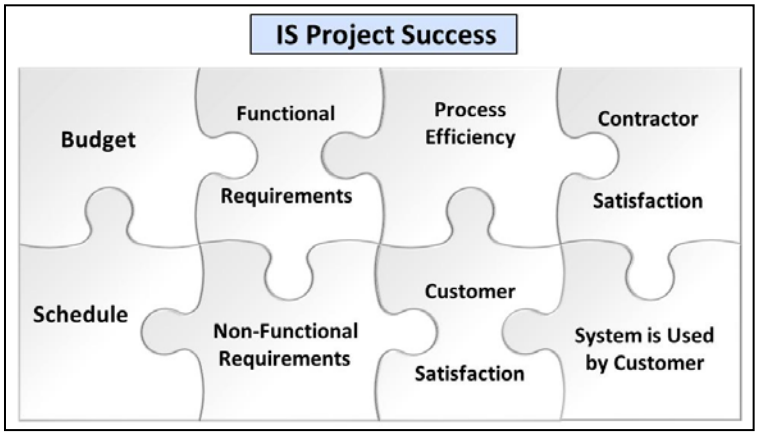

Figure 4: Project Managers' View of ISPS Criteria

DISCUSSION

Our results indicate that ATP plays an important role in project managers' view of ISPS, which is consistent with literature. The disunity among scholars regarding separation of the third ATP criterion (requirements) is also reflected in our results. Some respondents considered meeting requirements to be an entity, whereas others clearly differentiated between functional and non-functional requirements, partly even mentioning them separately in different ladders. In our opinion, the appropriate level of detail for this criterion depends on the context. If, for instance, the impact of success factors on different success criteria is of interest, functional and non-functional requirements should be considered separately as the according impacts on them might differ. From the project management perspective (e.g., Agarwal and Rathod, 2006), a unified view on these concepts seems suitable as they together represent the project scope.

However, while confirming its role, our results clearly show that ATP is not sufficient to cover ISPS. Four other criteria emerged in our analysis. First, our results indicate that process efficiency should be considered separately from ATP. As described in *Theoretical Background*, the contrary is often present in literature. Only in case of perfectly realistic planning, meeting the resulting ideal plans is equivalent to an efficient process. In practice though, plans are not realistic for several reasons (cf. *Theoretical Background*), which emphasizes the importance of assessing process efficiency as well. Taking matters a step further, one could wonder whether or why ATP is relevant at all if process efficiency is being considered. Imagine a project that misses its budget and schedule targets despite being conducted as efficiently as possible. Obviously, the plans were not realistic – so should not process efficiency be the determining criterion and the project considered

successful in this case? However, developing accurate plans (and meeting them) is one of the main project management challenges and the degree of achieving it should be reflected in project success assessment. Furthermore, project plans affect expectations of project stakeholders (Petter, 2008) and therefore other success criteria. For instance, the customer is likely to be less satisfied with the project if its costs exceed the planned budget, even if the estimated budget was unrealistic in the first place. Accordingly, both ATP and process efficiency should be used for success assessment (as indicated by our results).

Next, our findings confirm the need to include stakeholder satisfaction in ISPS assessment. The fact that customer satisfaction was mentioned more frequently than the well-established ATP criterion – meeting functional requirements – emphasizes its importance. This insight is not surprising as customer satisfaction is crucial for contractor reputation and contracting follow-up projects.

However, satisfaction of the contractor organization also should not be neglected. A project that exceeds customer expectations but results in substantial losses for the contractor is less likely to be considered a success by the latter (disregarding other possible benefits). This example illustrates that project success is a matter of perspective (cf. *Theoretical Background*). In the view of our respondents, contractors' project managers, contractor satisfaction is one of the criteria to be considered in success evaluation.

Our last criterion reflects the satisfaction of a third stakeholder group – end-users – by indicating whether they actually use the developed system after deployment. This long-term criterion is only applicable a certain period of time after project completion, which might be the main reason why it was comparatively rarely mentioned by our respondents. As the most common point in time for success assessment is right after project completion, most respondents might apply this view and therefore neglect this and other long-term criteria (e.g., meeting customer's strategic goals). However, we consider reassessing project success later by including such long-term criteria to be important as they might be decisive and influence other criteria. For instance, customers might be satisfied with the course of a project right after completion but change this perception radically if end-users do not use the deployed system.

Overall, our identified success criteria include satisfaction of three stakeholder groups (contractor organization, customer organization, and end-users). In contrast to existing literature (cf. *Theoretical Background*), contractor's team member satisfaction is missing. This might be due to the fact that we asked contractors' project managers, who consider themselves to belong to this stakeholder group. Accordingly, their own satisfaction equals their overall view of project success. At this point, we once again emphasize the importance of perspective and its impact on the criteria to be included in success assessment.

CONCLUSION

We investigated project managers' view on ISPS criteria. In order to minimize biases, we did not ask for success criteria directly but applied RepGrid and laddering to derive the criteria. Our results indicate that traditional adherence-to-planning criteria are important but not sufficient for ISPS assessment. Process efficiency and satisfaction of stakeholders (foremost the customer) must also be considered. Additionally, actual usage of the system by end-users is an important aspect to be included in the long-term assessment.

Our sample size limits the result's generalizability. However, the qualitative nature of our study suits the objective to gain insights into the practitioners' perception of ISPS criteria. Another limitation is our focus on the view of project managers. Keeping the importance of success assessor's perspective in mind, further studies are required to explore other stakeholders' perspectives and compare them to our results. Considering that the traditional success assessment using ATP emerged from a project management perspective and that according to our results project managers consider success criteria beyond ATP to be relevant, it might be reasonably assumed that other stakeholders (e.g., end-users, developers) attach importance to other project success criteria as well.

Studies in the research stream focusing on identification and analysis of ISPS factors require a valid and reliable operationalization of ISPS as dependent variable. Moreover, the use of such a dependent variable enables the comparability of different studies and avoids misleading interpretations. Considering that the often-applied ATP perspective is likely to be insufficient, additional or alternative criteria must be scrutinized. Future research is thus in need of detailed analyses of the success criteria identified in our study, especially with regard to construct operationalization.

Our findings contribute to research by illuminating practitioners' perspective in an innovative manner. Researchers can use our results to develop a substantiated set of success criteria in future studies. Furthermore, our results serve as basis for investigating possible interdependencies between success criteria. For example, it appears likely that both ATP and the end-users' actual usage of the system contribute to customer satisfaction, which in turn is likely to affect contractor satisfaction. Practitioners gain insights into the expert perspective on project success and might rethink their way of assessing success of

their IS projects. Companies depend on a valid ISPS measurement as otherwise proper project evaluations are not feasible. As projects need to exhibit benefits to justify their cost, companies may draw misleading conclusions for future projects if benefits are evaluated inaccurately. Our findings show that in IS project managers' perception, time has come for organizations to follow the insights in research by expanding the view of adherence to planning as single criterion for success assessment.

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