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Ladder to success – eliciting project managers' perceptions of IS project success criteria

Oleg Pankratz
University of Cologne
Albertus-Magnus-Platz, 50923 Cologne
Germany
www.shortbio.net/pankratz@wiso.uni-koeln.de

Dirk Basten
University of Cologne
Albertus-Magnus-Platz, 50923 Cologne
Germany
www.shortbio.net/basten@wiso.uni-koeln.de

Abstract:
The traditional approach to assess information system (IS) project success is adherence to planning (ATP) – meeting budget, schedule, and requirements targets. 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' subjective perspectives by investigating what 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 in addition to ATP. Scholars can use our findings to apply 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; project management; Repertory Grid; laddering.

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1. Introduction

The assessment of information system (IS) project success has a long research tradition (e.g., [1–3]). IS project success 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 [1, 4–6], to measure IS project success in success reports (e.g., [7–9]), and to be used as dependent variable in empirical studies [10–12]. The ATP criteria are widely applied as they are easy to measure and considered to be objective [13, 14].

However, many authors strongly question the sufficiency of ATP alone to adequately measure IS project success (e.g., [1, 4, 5, 15, 16]). Whereas there is agreement that ATP is adequate to assess development process success, its usage to evaluate overall project success is criticized as ATP criteria only cover a limited, that is, short-term perspective [1, 4]. In line with this criticism, scholars propose and argue for alternative or at least additional criteria like process efficiency [6, 17], satisfaction of various stakeholder groups [17, 18], and benefits for strategic company goals [19].

Despite a substantial body of research and many emerged criteria suggestions, there is no agreed-on set of IS project success criteria among researchers and practitioners. One reason for this lack of agreement is said to be that success means different things to different people – it is a matter of perspective (e.g., [3]). Another reason might be that the proposed criteria are in many cases derived from theoretical considerations (e.g., [1, 2, 15, 17, 20, 21]) rather than from analyzing practitioners' subjective perspectives. Whereas theoretical considerations are essential, a substantiated approach to derive success criteria should also incorporate the knowledge of expert practitioners. In this paper, we aim to analyze practitioners' subjective perspectives and focus on one particular stakeholder group, 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: *What criteria do IS project managers consider relevant for IS project success assessment?*

We conduct an empirical qualitative study among experienced IS project managers. Simply asking practitioners what success criteria they consider relevant (e.g., by questionnaires or interviews) bears the risk of respondents being influenced by current success evaluation regulations in their organizations. In this case, they are likely to refer to the status quo instead of their desired state. Therefore, we apply a knowledge-eliciting technique called Repertory Grid (henceforth: RepGrid; cf. [22]) and its extension, Laddering [23]. 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 mentioned above.

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

The paper proceeds as follows. In section 2, we provide the theoretical background on IS project success measurement and fundamentals of RepGrid and Laddering. Subsequently, we use section 3 to describe our research approach explaining the design of RepGrid and Laddering in our context. Afterwards, we present (section 4) and discuss (section 5) our results, substantiated with quotes from our interviews. We conclude with limitations and implications for future research and project management in section 6.

2. Theoretical background

2.1 IS project success

A project in general is "a temporary endeavor undertaken to create a unique product, service, or result" [24, 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" [25, p. 46]. An IS project can thus be seen as a temporary and unique endeavor with the objective to develop, extend, or adapt an IS.

Like the difference between an IS and a project in which an IS is developed, a conceptual distinction needs to be made at this point between IS success and IS project success. The former concept refers to the success of an IS as a product, the latter relates to the success of the unique and temporary endeavor to create an IS. Probably the most noted framework for IS success is the model suggested by DeLone and McLean [26]. The updated version of this framework [27] includes six interdependent criteria that constitute IS success: information quality; system quality; service quality; use/intention to use; user satisfaction; and net benefits. Assessing product success might be part of or overlap with assessing project success – in fact, many researchers consider the (IS) project success concept to consist of the two major components process and product success [17, 28–32]. Thus, an equalization of IS success and IS project success from the outset would be fundamentally inadequate. First, IS success does not account for the success of the development *process*, which is essential in any IS project. Second and assuming that product success *is* the second component of project success, simply adopting IS success criteria as part of IS project success is questionable since potential deviations are excluded from consideration. For example, since the perspective on the matter might differ (product as a whole *vs.* product as part of a project), success assessments might be undertaken at different points in time. Accordingly, in one of his works, DeLone himself applies a set of nine IS *project* success criteria [33], only four of which correspond to criteria from the updated DeLone and McLean model. Yet other researchers focusing on IS project success do not refer to this model at all [30, 34, 35]. Overall, given this conceptual distinction between IS success and IS project success, we focus on the challenge of assessing the latter in this paper.

As (IS) projects are typically defined with regard to cost, schedule, and requirements [36], their success is traditionally assessed in terms of ATP, that is, adherence to budget, adherence to schedule, and conformance with specified requirements [1, 17]. 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 [30, 34], quality [1], performance [15], specification [35], and scope [4]. Second, some authors explicitly differentiate between meeting functional and non-functional requirements (e.g., Agarwal and Rathod [4] differentiate between functionality and quality as components of scope) while others do not (e.g., [1]). Functional requirements represent features of a developed product whereas non-functional requirements are quality requirements like usability or performance [13].

Furthermore, numerous authors strongly question the sufficiency of ATP as sole criterion to measure IS project success (e.g., [1, 4, 5, 15, 16]) for the following reasons. First, ATP does not account for long-term customer benefits [1, 4]. Projects initiated for profit reasons should be assessed according to related criteria [16]. Second, estimates underlying project plans are often inaccurate [37] due to the lack of methods to adequately estimate budget and schedule [4]. Third, project plans are often biased due to negotiations or political actions [38]. Finally, project success is seen as matter of perspective [3], and ATP probably does not suit the perspectives of all stakeholders. As a consequence, a variety of further criteria have been proposed over the past decades. Examples include process efficiency (e.g., [6, 17]) and stakeholder satisfaction (e.g., [17, 18]). Overall, while there is agreement on the multi-dimensionality of IS project success (e.g., [4, 20]) and on the importance of ATP as part of it, researchers still lack mutual understanding of the complete picture of IS project success. This incomplete puzzle of IS project success criteria is illustrated in Fig. 1.

Regarding process efficiency as one of the suggested further criteria, it is worth noticing that this criterion has at times been equated with ATP [16, 20, 39]. We emphasize that this equalization is inadequate. For instance, a project can be performed highly efficiently but still not meet its plans if these were unrealistic in the first place. As pointed out above,

scholars argue that effort estimates underlying project plans are often incorrect [37] due to a lack of reliable estimation methods [4]. Additionally, empirical findings confirm the difference between ATP and process efficiency [40].

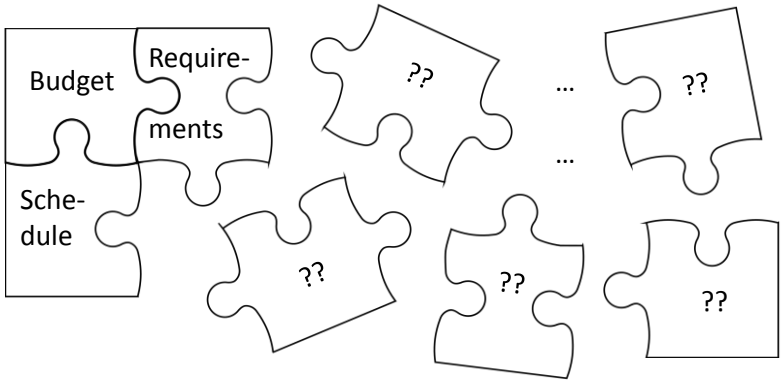

Fig. 1. Incomplete puzzle of IS project success criteria

The satisfaction of various stakeholders is another commonly proposed success criterion. Common stakeholder groups include the customer (as organization), the end-users, the contractor (as organization), and the project team [2, 13]. Here again, no agreement regarding the role of stakeholder satisfaction prevails in research. For instance, Nelson [30] equals the satisfaction of all stakeholders to project success, whereas Baccarini [17] considers the satisfaction of stakeholder groups to be among other sub-criteria of project success. Yet other researchers place particular emphasis on the importance of customer satisfaction [41, 42].

Another interesting aspect refers to the point in time at which success of a project is assessed [3, 17, 43]. Whereas assessments directly after project completion are required for managerial implications like evaluation of the project manager, other criteria like strategic benefits for the contracting organization [19] and end-user system acceptance [44] are only evaluable in later stages of the information system's life cycle. 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.

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

2.2 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 [45]. Kelly claims that all people have a mental model of reality and use 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 [46]. Constructs are elements' qualities which people use to differentiate among elements, for example human qualities like kindness, physical attributes like color, or evaluating qualities like usefulness [46]. Furthermore, constructs possess several important qualities themselves [47]. First, they are bipolar in nature – people "never affirm anything without simultaneously denying something" [47]. Therefore, constructs have an emergent and a contrast pole, for instance tall – small (people); innovative – outdated (technology); innovative – established (technology). As the two latter examples demonstrate, the

contrast pole is essential for capturing the whole meaning of a construct. Second, constructs are hierarchically related to each other – the personal construct system of each individual is a unique hierarchical structure of super- and subordinate constructs. Third, Fransella et al. [47] 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. In fact, Shaw and Gaines [48] 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 in an adequate way (e.g., by Laddering as described below) is crucial for the validity of a qualitative study. A comprehensive description of PCT can be found in Kelly [45] or Fransella et al. [47].

RepGrid was developed by Kelly [45] 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 chosen for comparison and the respondent is asked to identify a difference between them. Whereas Kelly's original method of triads was based on his theory how constructs are first formed, Fransella et al. [47] argue that there is no reason to use three elements when eliciting constructs that are already established in one's personal construct system. In fact, triads are more cognitively exhausting and should be used with care in complex domains. An extensive overview of numerous design alternatives of RepGrid and according applications is given in Tan and Hunter [22].

One of RepGrid's advantages is that it explores how participants construct their model of reality while other survey instruments mostly seek to confirm what the researcher assumes [49]. Thus, RepGrid focuses on the respondents and their experience, thus minimizing researcher bias. RepGrid has been widely and effectively applied in qualitative studies in IS research. Amongst others, Tan and Gallupe [50] used it for examining business and IT thinking; Napier et al. [51] applied it to explore the skills of successful IT project managers; and Siau et al. [52] took advantage of RepGrid to investigate characteristics of team members.

Laddering is an extension to RepGrid, developed by Hinkle [53] to account for the hierarchical relations between personal constructs. In the process of Laddering, the interviewer asks additional questions regarding each identified construct and can move in different directions [23]:

- Downwards, eliciting explanations and members of classes (by asking questions like "How could you tell that something was X?" or "Can you give me examples of X?");
- Upwards, eliciting information about higher-level constructs ("Why would you prefer X?");
- Sideways, eliciting further constructs at the same hierarchical level ("Can you think of more aspects like X?").

Downwards Laddering counteracts potential semantic ambiguities by clarifying meaning whereas Upwards Laddering uncovers underlying hierarchical relations between constructs and quickly leads to top-level constructs, which represent personal core beliefs of the respondents. Both Downwards and Upwards Laddering were crucial in our inquiry. Sideways Laddering can be applied to help the interviewees identify further constructs; it was not used in our study as our respondents had no difficulty in thinking of new constructs.

3. Research approach

We interviewed eleven experienced IS project managers, two females and nine males. Our informants worked in IT service departments of three large German organizations in the industries logistics, IT consulting, and insurance. Interviews, conducted in 2008 and 2009, were recorded and transcribed afterwards. All respondents worked on application development projects on behalf of a contractor, with an average of 14.3 years in IS development. Table 1 lists our respondents (all names have been altered to ensure confidentiality).

Table 1. Respondents' demographics

Name	Job title	Industry	Experience in IS development (years)	Participated in IS projects (quantity)
Frank	IT project manager	Logistics	22	20
Thomas	IT project manager	Logistics	20	30
Stephen	Senior project manager	Logistics	15	50
Michael	IT project manager	Logistics	15	30
Torben	Senior project manager	Logistics	18	75
Stacie	IT project manager	Logistics	5.5	8
Bernd	Manager	IT Consulting	10	15
Katarina	IT project manager	Logistics	10.5	40
Christian	Head of application development	Insurance	20	75
Marcus	Manager	IT Consulting	11.5	15
David	Senior Manager	IT Consulting	11	20

We investigated the subjective views of our respondents on relevant IS project success criteria. As mentioned earlier, asking about the success criteria directly bears the risk of project managers being biased by the current success assessment practice in their organization. To counteract this 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 [54]. Since Upwards Laddering leads to personal core beliefs at top-construct levels, we are confident that our respondents revealed their subjective views rather than prescribed answers about status quo when arriving at the top levels (criteria) of project success. The process of applying RepGrid and Laddering to derive success criteria was as follows (cf. also Fig. 2).

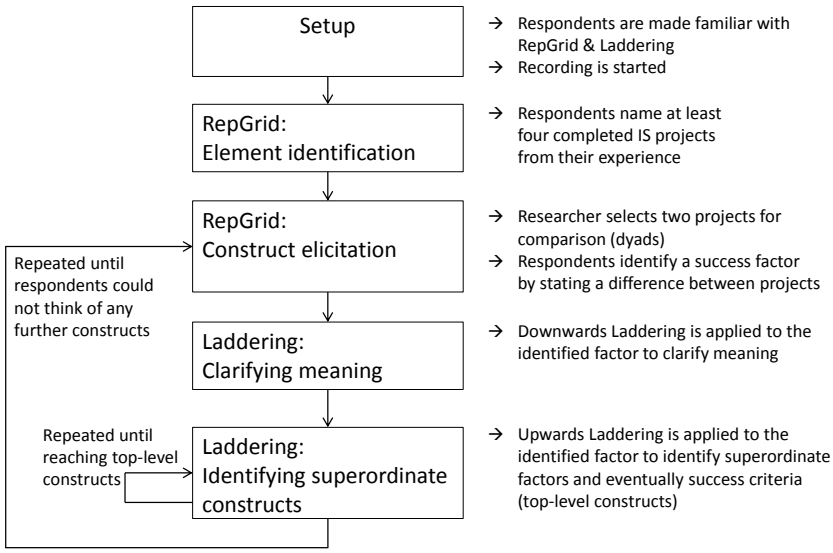

Fig. 2. Interview methodology

Each project manager named at least four of her/his completed IS projects that contained all typical software-developing phases and 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 asked our respondents to sort all identified projects by their success and chose the most and the least successful projects for comparison first. This allowed us an 'easy' start with many constructs for the first pair of projects. 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?" (in the following referred to as leading question). We clarified to our respondents that they were not restricted to any particular area and should mention any factor considered relevant. The possible factor categories in our leading question were used as contextual cues [22] and showed our respondents that they can and should think as broadly as possible. Following our data-driven research approach, we have taken particular care not to plant any answers but to let all information emerge from the interviewees. After our respondents stated a difference between projects, the interviewer asked for the contrast pole of the construct to capture its whole meaning. Once a factor was identified, we used Downwards Laddering to ensure a clear understanding. We then applied Upwards Laddering by asking "Why does [factor pole positively related to success] 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, resulting in project success". In doing so, we identified IS project success criteria (X in above example) without asking for them directly, thus counteracting status-quo bias. This approach resulted in numerous ladders from the 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 [55]. Two respondents made slight changes concerning single words. All but one perceived RepGrid to be a pleasant and motivating questioning technique. Subsequently, two researchers (interviewer plus one) analyzed collected data with the objective to identify IS project success criteria. We accomplished this by first scrutinizing the respondents' statements in detail and extracting all aspects that represented success, that is, constructs at the top level in respondents' ladders. Subsequently, these extracted aspects were consolidated into a set of distinct and clearly defined success criteria. The following example (cf. also Fig. 3) illustrates the crucial role of Downwards and Upwards Laddering in our approach.

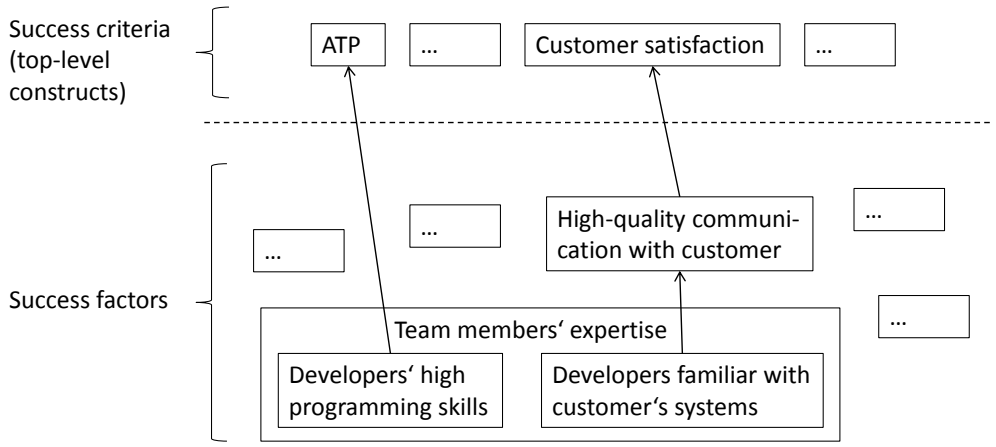

Fig. 3. Laddering example

Several respondents named expertise of contractor's team members to be a construct, that is, a success factor for IS project. Downwards Laddering revealed that different respondents used this terminology for different types of expertise (cf. "conflict" in the description of semantic constellations in section 2.2). For instance, one kind of expertise referred to developers' general programming skills and another to their familiarity with the 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 targets of the project (ATP, top-level construct). The second, however, raised the quality level of communication with the customer, which in turn led to higher customer satisfaction (top-level construct). Thus, we were able to identify the success criteria ATP and customer satisfaction from these two ladders.

4. Results

In this section, we give insights into the identified IS project success criteria from the perspective of project managers by providing quotations, followed by an overview and definitions of the criteria (cf. Table 2 and Fig. 4).

Our respondents numerously mentioned the traditional ATP criteria, that is, meeting schedule, budget, and requirements as important for success evaluation. The following extract from one of the interviews demonstrates how, starting with the success factor (marked in bold) emerged from our leading question, we applied Laddering and established that adhering to plans plays an important role in the respondent's view of success:

Stephen: *In this project, the* ***structure was considerably better****. Clear responsibilities.* [Contrast pole:] *Not structured, chaotic, random.*

Interviewer: *How do you recognize that structure is good, beside clear responsibilities?* [Downwards Laddering]

Stephen: *Clear goals, defined timelines, defined quality objectives and stakeholders' responsibilities, clear definitions of tasks, work packages.*

Interviewer: *Why does clear, good structure contribute to project success?* [Upwards Laddering]

Stephen: *Because one notices earlier if something goes wrong and can take countermeasures to get back on track.*

Interviewer: *And why does this contribute to project success?* [Upwards Laddering]

Stephen: *Because then I can better achieve the objectives according to plans, that is, if I notice that I deviate somewhere, I can say: ok, here is a deviation, but it is alright, it has to be this way and I achieve my goals anyway. Or I can say: no, this deviation is unwanted, be it with regards to content, time, cost, quality or whatever. I have to take countermeasures in some form.*

Similarly, the following examples (Stacie, Michael, and Torben) show how we identified ATP criteria after one or several steps of Upwards Laddering:

Stacie: ***Clearly defined requirements.*** [Contrast pole:] *Incomplete requirements. […]*

Interviewer: *Why do clearly defined requirements contribute to success?* [Upwards Laddering]

Stacie: *If requirements are clearly defined, the developers can easily determine what they have to do to implement those requirements. And they can provide exact statements how long it will take and how much it will cost. One can better see the overall picture, the effects that requirements have on the development*.

Interviewer: *And why does this contribute to success?* [Upwards Laddering]

Stacie: *It leads to meeting budget and schedule targets at the end of the day and that the customer gets exactly what he wanted.*

Michael: ***Motivated project manager.*** [Contrast pole:] *Demotivated project manager. […]*

Interviewer: *Why does it contribute to project success?* [Upwards Laddering]

Michael: *An important aspect is that the project is technically interesting. If it is, then I am satisfied. It is important for me to enjoy the project. […] Then I am interested in customer's goals and can lead the project to commercial and technical success.*

Interviewer: *What do you mean by commercial success?*

Michael: *Staying within budget.*

Interviewer: *That is, staying within budget is important for you to consider a project successful?*

Michael: *Yes, meeting budget and schedule, and in addition delivering good quality. If this is the case, I am very satisfied with the project.*

Torben: ***Choosing qualified team members.*** [Contrast pole:] *Using available project resources. […]*

Interviewer: *Why does it contribute to project success?* [Upwards Laddering]

Torben: *If I can use qualified employees who possess the skills that are necessary for the project, it is more likely that the work is done meeting quality, time, and budget targets.*

Sometimes, individual ATP criteria were mentioned separately, according to the currently examined ladder, like product quality in the following interview extract:

Michael: ***Decision competence.*** [Contrast pole:] *Lack of decision competence. […]*

Interviewer: *Why does decision competence contribute to project success?* [Upwards Laddering]

Michael: *On an emotional level: You feel like there is progress in the project. It is possible that, in retrospect, some wrong decisions were made, but without decisions nothing is happening and it is in general demotivating, as people want to do something.*

Interviewer: *That is, decision competence leads to motivation?*

Michael: *Yes*.

Interviewer: *Motivation of all project members?*

Michael: *Yes.*

Interviewer: *Why does higher motivation of project members contribute to project success?* [Upwards Laddering]

Michael: *Because people have joy at work, participate actively and with pleasure, which eventually leads to better product quality.*

The next extracts are just a few examples of ATP criteria being mentioned by our respondents. However, we were able to identify efficiency of the development process as a stand-alone criterion as exemplary shown by the following two quotations:

Torben: ***Clearly defined responsibilities.*** [Contrast pole:] *Undefined responsibilities.*

Interviewer: *How do you recognize that responsibilities are clearly defined?* [Downwards Laddering]

Torben: *There is a description of roles, or there was a clarification of roles.*

Interviewer: *Why do clearly defined responsibilities contribute to project success?* [Upwards Laddering]

Torben: *Decisions are made faster and clearer, and division of labor is also clearer. This makes it all efficient and prevents redundant work.*

Interviewer: *And why does that contribute to success?* [Upwards Laddering]

Torben: *I need fewer resources to achieve the results.*

Later in the interview, Torben revisited process efficiency in another ladder by describing that team members are more efficient when they concentrate on one task rather than, for instance, being deployed in various projects. He explained that people need time to arrive at their most efficient work mode and that such decelerations can be avoided by staying focused on one project:

Torben: ***Project members work on this project only.*** [Contrast pole:] *Project members have other tasks, beyond the project.*

Interviewer: *Why is it important for project success?* [Upwards Laddering]

Torben: *It is the efficiency criterion again. Everyone needs setup times to focus on a project, to concentrate on a task on which one was working earlier, to get in the flow again.*

In addition to identifying process efficiency as an independent criterion, we collected extensive evidence for the satisfaction of various stakeholders as important IS project success criteria beyond ATP. Some respondents specifically emphasized stakeholder satisfaction, like David in the following extract:

David: *[ATP] is not everything that defines success. As a project manager, I am certainly motivated to achieve it, that is, meet the project's requirements, and that in the specified time and budget. But is it everything that defines success for me? No. It is, of course, also important to me that all stakeholders are satisfied […] and want to work on the next project with me. And if I accomplish it – people are satisfied, want to do something alike again, the customers are satisfied – that is the ideal success.*

Accordingly, stakeholder satisfaction was often mentioned in the Laddering process. If satisfaction of all stakeholders was said to be important without further distinction like in the following example, we accounted for it in our analysis in the identified stakeholder groups (i.e., customer and contractor organization).

Stephen: ***Financial scope****, which was more* ***defined*** *in this project.* [Contrast pole:] *Unclear budget situation. […]*

Interviewer: *Why does a defined financial scope contribute to project success?* [Upwards Laddering]

Stephen: *We are a numbers-driven company. And we measure ourselves in numbers and results. If it is clearly defined: this is the task, this is the emerging effort, and this is my budget for it, then I know exactly where I stand. In contrast to: Let's just begin, the money will turn up somehow. And you have to produce specific results with it. So in the process you never know: Am I still in scope or not? Can I spend more or not? This leads to dissatisfaction within the project, as nobody knows: where do we actually stand?*

Interviewer: *Whose dissatisfaction?*

Stephen: *Of all project stakeholders.*

However, the satisfaction of one specific stakeholder group – the customer organization – was mentioned and emphasized particularly often. For example, Torben stated that good knowledge of customer systems and processes, leading to other factors along the ladder (dialog with customer on a higher qualitative level, more precisely captured customer requirements etc.), ultimately results in customer satisfaction:

Torben: ***Project members familiar with customer systems and processes.*** [Contrast pole:] *No knowledge of customer systems and processes. […] Knowing customer systems and processes, I can enter into a dialog with the customers differently, and better capture their requirements and wishes, than if I have no knowledge and have to start from scratch. Customers do not automatically tell you everything worth knowing. And particularly regarding this knowledge about customers' systems and processes, this relationship on a personal, human level – due to the familiarity – supports project success. Since they feel understood and comfortable, and therefore are also easier to satisfy. In contrast to working with someone new, who they do not know and understand.*

In the following example, Torben elaborated on the effect of placing too much emphasis on keeping the formal requirements of the development process (correct labels of versions, documents etc.), thus neglecting the actual product. In his remarks, Torben mentioned how low product quality led to customer dissatisfaction, which in turn made him consider this project unsuccessful:

Torben: ***Appropriate formal approach.*** [Contrast pole:] *Overvaluation of formalities.*

Interviewer: *How do you recognize that formalities are overvalued?* [Downwards Laddering, here applied to the contrast pole]

Torben: *The quality managers were in control here. They demanded that every document has its correct name in the footer, in the acceptance state, in every version. And that all documents are located in the right place, that the right people approved them etc.*

Interviewer: *Why does the overvaluation of formalities reduce project success?* [Upwards Laddering, here starting with the contrast pole]

Torben: *Because it diverts the focus away from delivering a high-quality product. […] It causes that they* [employees] *focus on ensuring that all version numbers are correct. Whereas developing the best product is about conceptual issues. And having developed the best product is not of interest for anyone* [in case of overvalued formalities]. *It possibly comes to light at the end, when people realize that the product is not that good. If we pass the acceptance process and several hundred test cases are marked green, the job was done formally correct; however, the customer is not satisfied. So it should be a success, which it actually is not.*

Similarly, Stacie considered a project unsuccessful despite meeting the ATP criteria. She clarified that in her perception the project was unsuccessful due to the unsatisfied customer even though she or the contractor organization as a whole could not have done anything differently to prevent it:

Stacie: *In this project* [A], *the customer was more or less forced to undertake the development. So there* [project B] *we had a customer-driven development and here* [project A] *we had a development that emerged from the company situation. That was the difference. Here* [project A], *the owner of the application did not actually want the development, had to accept it and pay a great deal of money […]. Then the situation arose where time, quality, and budget were met but the customer was not satisfied anyway, as from his perspective he spent money that was not necessary to spend.*

Interviewer: *Sounds like the customer was not to be satisfied in this situation? As the project was conducted well and the three mentioned criteria were met, but customer was not satisfied, regardless of the project performance?*

Stacie: *Yes.*

Interviewer: *So from your perspective, this project* [A] *was unsuccessful although you could not do anything about it?*

Stacie: *Exactly.*

In turn, the satisfaction of the contractor organization was also considered important by several respondents. The following quotes from two different interviews (Michael and Marcus) exemplify the importance of this criterion, which can be seen as the correspondent part to customer satisfaction:

Michael: *In this project, it was annoying that we had a customer who changed his mind weekly. First he wanted to be treated as a novice, so we said ok, you get an assistant, we help you – like the assistant in Microsoft Office. Next week he said that he did not want to be treated as a child and that he is the expert. This was very unsatisfactory. With these fluctuating requirements, this unreliability of the customer, planning was impossible, which was very dissatisfying.*

Marcus: *Let's phrase it like this. Project management and the customer should be happy. […] You can say, the business customer should be happy, but the project management should also be happy, because the people should be happy.*

Finally, several respondents stressed the importance of considering the end-users and whether they actually use the developed product for assessing the success of a project. Here again, it was noticeable that this criterion was considered a necessary condition by our respondents to deem a project successful:

Christian: **[User]** ***Training and deployment of new system***. [Contrast pole:] *No training, no deployment phase. […] This is about the people who use the system. You have end-users, here clerks, they have to work with the topic. And this is not to be underestimated, since an application, that is, a project, is only successful if what you developed is in use. […] I cannot ignore the user groups.*

Later in the interview, Christian clarified that he considers a project unsuccessful if it produced what was requested in specified time and budget, but the system was not used in the customer organization.

In total, our approach yielded eight IS project success criteria. They are listed in Table 2 along with their definitions, number of different respondents who mentioned them, and overall frequency of occurrence (respondents often mentioned same criteria in different ladders).

Table 2. Identified IS project success criteria

	Success criterion	Definition	Number of respondents	Frequency of occurrence
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

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 (from ATP) aspect 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 deployed and used at the customer organization. Accordingly, from the (combined) perspective of our eleven project managers, the metaphorical puzzle of IS project success criteria (cf. also section 2.1) looks like illustrated in Fig. 4.

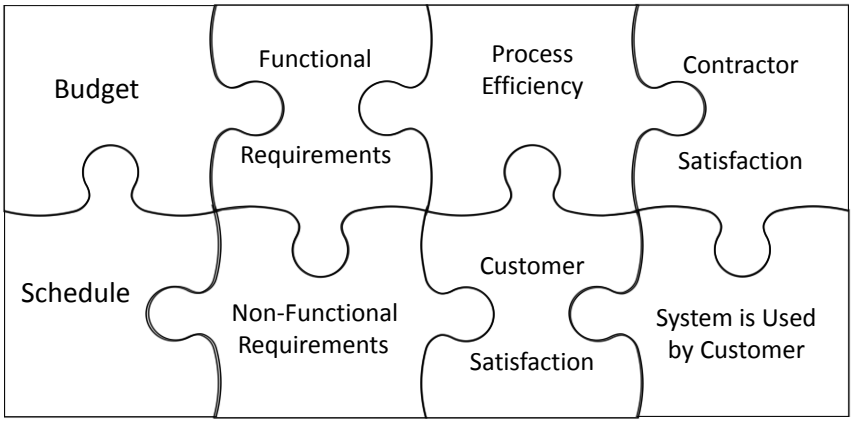

Fig. 4. Project managers' view of IS project success criteria

5. Discussion

Our results indicate that ATP plays an important role in project managers' view of IS project success, which is in line with the notion in 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. As Michael stated: *Another important criterion of the product quality is stability and robustness. The first goal is to fulfill the functionality. However, nowadays many people criticize that software is working, but is not stable, robust, and prone to errors*. In our opinion, the appropriate level of detail for the requirements 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, a unified view on these concepts seems suitable as they together represent project scope.

However, while confirming its importance, our results clearly show that ATP is not sufficient to cover IS project success. Four other criteria emerged in our analysis. First, our results indicate that process efficiency should be considered separately from ATP. As described in section 2.1, 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. In the interview, Bernd put it this way: *Estimates are based on experience, mean values etc., it is methodical. However, these mean values have the unpleasant feature never to apply in the concrete situation. […] If a project manager tells you, a project was once planned and it all proved right to the day, that is not the case and far from reality. Planning is a continuous process, to be adjusted over and over again according to the situation. There are change processes, the project scope changes. Every day you know more than the day before.*

[…] The plans are always wrong and the task of project management is to continuously make them less wrong. This emphasizes the importance of assessing process efficiency beside ATP.

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 mastering that challenge is reflected in the assessment of project success. Bernd added in this regard: *These* [ATP criteria] *are also aspects that directly affect my evaluation, my performance assessment. Delivering projects in time and in budget, these are my career goals right now. If I achieve that, it positively affects my salary.* This means that currently existing organizational mechanisms (i.e., employee assessment, not project success measurement) have an impact on Bernd's subjective perception of project success. Furthermore, project plans affect expectations of project stakeholders [56, 57] 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).

Our findings stress the need to include stakeholder satisfaction in IS project success assessments. In fact, stakeholder satisfaction was often equaled to the overall success by our respondents (cf. also [30]). As David stated: *People are satisfied, want to do something alike again, the customers are satisfied – that is the ideal success* (cf. also section 4). This suggests considering the satisfaction of individual stakeholder groups as direct sub-criteria of project success. In particular, the satisfaction of the customer organization was emphasized repeatedly. While the qualitative nature of our study does not allow for statistically significant quantitative statements, it is interesting that customer satisfaction was mentioned even more frequently than the well-established ATP criterion – meeting functional requirements (cf. Table 2). As regards the relation between ATP and customer satisfaction, our data indicates that meeting ATP criteria contributes to satisfaction of customers (as well as other stakeholders): *In time: in budget; and quality. These are essential, as quality has very much to do with customer satisfaction. In time and in budget, too, but not as much* (Bernd). However, our respondents described many cases where they considered a project failed due to customer dissatisfaction despite meeting the plans (e.g., cf. Stacie's quote in section 4). Analogously, projects were considered successful if the customer was satisfied in spite of unfulfilled plans: *Daily, discussing a change or any other issue, there are situations like: We have alternatives 1, 2, and 3, these are the respective costs of the alternatives, which one do you want? And the participants* [customers] *decide and know: We decided that, it will cost more, but we get more in return, we all like it very much, we are satisfied, and this was a good decision. Afterwards, nobody asks whether it cost one million more and was therefore a failure. Instead, one knows: We invested more, but got great value for it* (Bernd). These insights suggest that, while being influenced by ATP, customer satisfaction is actually more important than ATP and a necessary criterion for a successful project in the view of contractors' project managers. This finding is not surprising as customer satisfaction is decisive for contractor reputation and follow-up projects.

The second stakeholder sub-group is the overall contractor organization, including the team members, contractors' management, and the project managers themselves. According to our respondents, the satisfaction of this group is also an important success criterion. 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). As Bernd put it: *If the customer is satisfied, the project is a success from his perspective. From ours, too, usually; but exceptions are possible, like in this project. It was very successful for the customer, but has to be seen with mixed feelings from our side. Successful in a lot of respects, but for example unsuccessful regarding economic concerns.* Our results indicate that contractor satisfaction is influenced by customer satisfaction, but also by other aspects (e.g., ATP, process efficiency).

Our last criterion accounts for the end-users by indicating whether they actually use the developed system after deployment. The end-users are a sub-group of the customer organization that is often emphasized in literature (cf. section 2.1). Following Lyytinen and Hirschheim [58], we assume that customer satisfaction is related to the usage

of the system. However, both criteria should be used for success evaluations; for example, it is possible that customer management is not satisfied with the project course or the product but the end-users still use the developed system. 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 many projects have been completed shortly before our interviews, our respondents might have applied a short-term perspective and thus neglected 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. Wilson and Howcroft [59] point out that the perception of project success or failure can change in course of system usage although the system is not changed. For instance, customers might be satisfied with the project course right after completion but change this perception radically if end-users do not adopt the deployed system.

Overall, our identified criteria seem interrelated rather than being disassociated aspects on the same hierarchical level. For example, our interviews indicate that process efficiency contributes to fulfilling time and budget targets, and both process efficiency and ATP have a positive effect on contractor and customer satisfaction. Customer satisfaction in turn seems to be related to system usage and to contractor satisfaction. However, since our research approach aimed at identifying a broad set of criteria, we intentionally do not dig deeper into the hierarchical relationships between the identified IS project success criteria at this point.

An interesting aspect that emerged in the interviews was that our respondents described variations of success criteria or factors depending on the project situation. For example, Bernd pointed out: *This is an important factor, but I cannot describe its effect in general. Highly skilled experts, that is, having the right people on the right spot, is the more important the smaller a project is. The bigger a project is and the longer it lasts, the more important is the right mix of people.* Regarding the importance of staying within budget for project success, Katarina explained: *It depends on whether this is a time-and-material project. In case of a fixed-price project, we will probably reject customer's requests, however eager the customer may be. If it is a time-and-material project, we can make a change request of it.* These insights indicate that project success is a concept that is not to be seen in the same manner in different situations, which is in line with the growing research stream advocating the contingency approach in project management (e.g., [3, 60]). In the context of IS project success measurement, this view suggests that the relevance of success criteria varies depending on so-called contingency variables like project characteristics, point in time of assessment, or stakeholder perspective. In the present study, we took the perspective of project managers and aimed to identify all success criteria considered relevant from this particular point of view. Within this specific group, the relevance of the identified criteria may still vary depending on further contingency variables like project size or complexity. While out of scope in this paper, we invite further research to gain more detailed insights into criteria variations among particular stakeholder groups.

6. Conclusion

In this study, we investigated project managers' views on IS project success criteria. In order to minimize potential 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 IS project success assessment. Process efficiency and satisfaction of stakeholders, foremost the customer, must also be considered. The actual usage of the system by end-users is an important aspect to be included in the long-term assessment.

6.1 Limitations

One limitation of our study is the sample size, which limits the generalizability of the results. However, the qualitative nature of our study suits the objective to gain in-depths insights into the practitioners' perception of IS project success criteria.

Another limitation is our focus on the view of project managers. Keeping the importance of success assessors' perspectives in mind, further studies are required to explore other stakeholder 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 is reasonable to assume that other stakeholders as well (e.g., end-users, developers) attach importance to other project success criteria.

6.2 Implications for researchers

Studies in the research stream focusing on identification and analysis of IS project success factors require a valid and reliable operationalization of IS project success as dependent variable. Such a dependent variable enables the comparability of different studies and avoids misleading interpretations. Considering that the often-applied ATP perspective is regarded 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' perspectives 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 are related to customer satisfaction, which in turn is likely to affect the satisfaction of the contractor. Finally, having identified a substantiated set of criteria that should be used to assess IS project success is the starting point for research to develop an approach for measuring these criteria. We believe that it is especially important to scrutinize the measurability of process efficiency in IS projects as this is still an unsolved challenge.

6.3 Implications for practitioners

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 measurement of IS project success 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 the view of IS project managers, time has come for organizations to follow the insights in research by expanding the stance of adherence to planning as single criterion for success assessment.

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Biographical notes

Oleg Pankratz
Oleg Pankratz is a Research Assistant at the Department of Information Systems and Systems Development at the University of Cologne, Germany. His research interests include IT project management topics like success of information system projects and knowledge management. He has published papers in the proceedings of conferences like ECIS, AMCIS, MCIS, and ICIS.

www.shortbio.net/pankratz@wiso.uni-koeln.de

Dirk Basten
Dirk Basten is an Assistant Professor at the Department of Information Systems and Systems Development at the University of Cologne, Germany. His research interests include IT project management topics like success of information system projects and software development effort estimation as well as knowledge management and organizational learning. He has published papers in the *Communications of the Association for Information Systems*, *IEEE Computer*, *Journal of Computer Information Systems*, *Journal of Information Technology Teaching Cases*, *International Journal of Information Technology Project Management*, and the proceedings of conferences like *HICSS*, *ECIS*, *AMCIS*, and *ICIS*.

www.shortbio.net/basten@wiso.uni-koeln.de