DO PROJECT CHARACTERISTICS INFLUENCE THE RELEVANCE OF IS PROJECT SUCCESS DIMENSIONS?

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DO PROJECT CHARACTERISTICS INFLUENCE THE RELEVANCE OF IS PROJECT SUCCESS DIMENSIONS?

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Abstract

Despite being a topic of discussion among researchers for many years, measurement of information system project success (ISPS) is still an unsolved challenge. Scholars in information systems as well as general project management literature propose various approaches for assessing this concept. Instead of seeking a generally accepted measurement approach, some scholars suggest to assess ISPS by applying situational models, that is using different success dimensions depending on situational variables like stakeholder perspective or project type. This article outlines on-going research concerning relevant dimensions of ISPS depending on specific project characteristics. We conduct a quantitative empirical study using questionnaires among information system project managers. We continue existing research on ISPS measurement by providing statements about the relevance of potential success dimensions for project characteristics like contract type or type of contracting organisation. Preliminary results collected from 53 projects indicate that certain dimensions (e.g. meeting functional requirements and customer satisfaction) are consistently considered relevant regardless of project characteristics, whereas the importance of other dimensions (e.g. adherence to schedule) varies depending on such characteristics. We aim at contributing to a more adequate assessment of ISPS using situational models, which is of high relevance for both researchers and practitioners.

Keywords: Information systems, project success, success dimensions, situational models, project characteristics.
1 Introduction

Despite being a topic of discussion among researchers for many years, the measurement of information system project success (ISPS) is still an unsolved challenge. An agreed-on understanding of the constituent dimensions of this concept is missing; instead, various diverging approaches exist (cf. for different approaches Agarwal and Rathod, 2006; Aladwani, 2002; Baccarini, 1999; Barclay et al., 2009; Nelson, 2005; Yetton et al., 2000).

A plausible reason for this disagreement may be that ISPS is a concept which cannot be assessed the same way in different situations and/or from different perspectives. For example, ISPS is suggested to be a subjective matter (Myers, 1995), which leads to perceived differences depending on the stakeholder perspective (Dvir et al., 1998; Ika, 2009). Along those lines, Dvir et al. (1998) suggest to assess ISPS using situational models instead of one generally accepted approach. Such models depend on specific contexts, that is the relevance of constituent dimensions of ISPS varies depending on different variables like a specific type of project or a specific group of stakeholders.

The effect of stakeholder perspective is examined in another work (Basten et al., 2011). In our paper, we focus on different assessments of ISPS depending on specific project characteristics like contract type or project size. We do not formulate hypotheses in advance but conduct a quantitative empirical study. We ask information system (IS) project managers to participate in our survey to link managers’ experiences regarding the relevance of success dimensions in their projects to specific characteristics of these projects. Thereby, we are able to derive statements about relevance of ISPS dimensions depending on specific project characteristics and answer the following research question:

Do project characteristics influence the relevance of IS project success dimensions?

With our study, we aim at contributing to the development of a situational approach of assessing ISPS. Such an approach should allow for a more adequate measurement of ISPS, which is of high importance for scholars and practitioners. In research, ISPS is often used as dependent variable in causal models (e.g. investigating the impact of specific success factors on project success; selected examples include Petter, 2008 and Sharma and Yetton, 2007). One premise for the validity of such studies is the adequate measurement of the dependent variable. For practitioners, adequate assessment of ISPS is critical for making appropriate decisions about future projects.

The remainder of this paper is organised as follows. In the next section, we describe the current state of research on ISPS measurement, motivating our study. We then present our research approach in section 3, followed by the preliminary results in section 4. We conclude with a discussion and our expected contribution in section 5.

2 Measurement of Information System Project Success

Traditionally, (IS) project success is measured by using a project’s adherence to schedule, adherence to budget, and conformance with specified functional and non-functional requirements and/or quality as success criteria (Agarwal and Rathod, 2006; Ika, 2009; Karlsen et al., 2005). Scholars in IS as well as general project management research agree that assessing (IS) project success by using only these (planning-related) criteria is inappropriate (Agarwal and Rathod, 2006) or at least insufficient (Dvir et al., 1998). Many (IS) projects provide evidence for this view: There are both projects considered successful despite not meeting plans and projects perceived as failures in spite of satisfying the traditional criteria (Furulund and Moløkken-Østvold, 2007; Ika, 2009). Nelson (2005) speaks of successful failures or failed successes, respectively. In general, researchers widely agree that adherence to planning is important for assessing (IS) project success, but see the latter as a so-called multidimensional construct (Aladwani, 2002; Ika, 2009; Thomas and Fernandez, 2008; Yetton et al., 2000) and suggest further criteria (=dimensions) for its measurement. Commonly proposed criteria
include efficiency of the development process (Baccarini, 1999; Thomas and Fernandez, 2008) and satisfaction of different stakeholders (Baccarini, 1999; Karlsen et al., 2005).

However, there is still no agreed-on understanding of the dimensions of ISPS as diverging approaches show (e.g. Agarwal and Rathod, 2006; Aladwani, 2002; Baccarini, 1999; Barclay et al., 2009; Nelson, 2005; Yetton et al., 2000). One of the various different approaches to organise the multiple criteria is to divide (IS) project success in two major dimensions process success (synonymously project management success, implementation success) and product success (Baccarini, 1999; Collins and Baccarini, 2004). Similarly to this approach, Liu et al. (2011) differentiate (process) efficiency and (product) effectiveness as two major dimensions of project success. Nelson (2005) also divides ISPS in two major criteria process and outcome but sees the satisfaction of all stakeholders as the overall criterion for project success. This is different from Baccarini’s (1999) approach, which considers satisfaction of different stakeholders to be sub-criteria of process and product success.

Yet other researchers doubt that it is reasonable to define one concept of ISPS and apply it to different types of projects or products (Dvir et al., 1998; Karlsen et al., 2005) and different types of stakeholders (Liu and Walker, 1998). In previous research, scholars found that all projects are different and need to be treated accordingly: “Indeed, no two projects are alike” (Shenhar and Dvir, 2004, p. 1265). With our quantitative study, we hope to shed light on the relevance of ISPS dimensions in this context. Instead of one generally accepted definition, Dvir et al. (1998) demand the development of a situational approach for measuring ISPS. A situational approach implies different success models which depend on specific contexts, that is they account for the impact of so-called contingency variables like a specific type of project or a specific group of stakeholders. The relevance of the success’ constituent dimensions differs depending on the values of such contingency variables. For instance, a fixed-price project (where client and contractor agree upon a price beforehand) may be assessed differently than a time-and-material project (where contractor gets paid according to his effort) as the relevance of success dimensions may vary depending on the contract type of the project.

We support the need for a situational approach as it seems reasonable that ISPS is a concept which cannot be assessed in the same way in different situations. This is in our view a major reason for the disagreement in research regarding the measurement of ISPS as described above.

3 Research Approach

We designed a questionnaire which we distribute to IS professionals who participated as project managers or in a related function (e.g. technical project managers, program managers) in IS development projects on behalf of the contractor organisation. We focus on projects in which application software was developed for a client organisation. In the questionnaire, the respondents (1) characterise completed IS projects and (2) rate the relevance of potential ISPS dimensions for the characterised projects. Based on this data, we are (3) able to derive statements about relevance of ISPS dimensions depending on specific project characteristics in our data analysis.

(1) In order to gain general insights into a project, we ask for a project’s name, description, time period, size (number of contractor’s team members), degree of success (successful; successful, but with problems; failed, but partially successful; failed), and respondent’s position. We then ask the respondents to characterise their projects by providing the following specific project characteristics, which we developed by adapting the IS projects classification results of previous research (Dvir et al., 1998): 1. Project type (holistic vs. partial); 2. Contractor type (internal vs. external); 3. Contract type (fixed-price vs. time-and-material project); 4. Form of contracting organisation (private vs. public); 5. Special characteristics, if applicable (e.g. high complexity, very relevant to security, fixed deadline, novel technology).

(2) The potential ISPS dimensions rated in our questionnaire are listed in Table 1. We adopted this list from previous works concerning the measurement of ISPS (Basten et al., 2011; Joosten et al., 2011).
Table 1. Potential ISPS dimensions (adopted from Basten et al., 2011; Joosten et al., 2011).

Respondents rate each of the provided potential ISPS dimensions concerning their relevance in each characterised project. Figure 1 provides an example of this rating process. For each potential dimension (exemplary in Figure 1: Process efficiency), a short definition is given, followed by the projects that the respondents characterised in the beginning of the questionnaire. Each dimension is to be rated on a 7-point Likert scale regarding its relevance in the particular projects. Thus, we establish the link between the relevance of all potential dimensions and all collected project characteristics via the respondent’s projects.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Definition</th>
<th>Project: ABC development</th>
<th>Project: …</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process efficiency</td>
<td>Ratio of objective achievement to the effort expended (budget, particularly human resources)</td>
<td>○ ○ ○ ○ ○ ○ ○</td>
<td>○ ○ ○ ○ ○ ○ ○</td>
</tr>
</tbody>
</table>

Figure 1. Example of dimensions rating: Process efficiency.

(3) In data analysis, we cluster collected projects according to specific characteristics (e.g. fixed-price projects vs. time-and-material projects, highly complex projects, and projects with a fixed deadline) and analyse the effect of such project characteristics on the stated relevance of success dimensions. In the current (preliminary) analysis stage, we calculate the mean and median values for the relevance of each dimension. Significance tests for the difference between dimensions’ relevance are not meaningful due to the (yet) low sample size.

4 Preliminary Results

Our study is at the beginning of the data collection stage. So far, we collected data over 53 projects (with an average of 17 team members and 15 months duration) from 20 experienced project managers (with an average of 34 projects and 16 years of IS development experience).

As an initial part of our data analysis, we calculated the mean and median values for the relevance of the potential ISPS dimensions for the different project characteristics. The preliminary results indicate certain constellations regarding the relevance of specific dimensions depending on project characteristics. As an example, we present the mean and median values for the characteristic contract type (fixed-price vs. time-and-material projects) to provide a first picture (cf. Table 2). The means and
medians are average values over 53 projects collected so far (of which 18 were fixed-price and 35 time-and-material projects).

<table>
<thead>
<tr>
<th>ISPS Dimension</th>
<th>Fixed-price projects (n = 18)</th>
<th>Time-and-material projects (n = 35)</th>
<th>Mean values difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adherence to budget</td>
<td>4.89</td>
<td>4.74</td>
<td>0.15</td>
</tr>
<tr>
<td>Adherence to schedule</td>
<td>6.06</td>
<td>5.31</td>
<td>0.75</td>
</tr>
<tr>
<td>Meeting functional requirements</td>
<td>6.33</td>
<td>5.97</td>
<td>0.36</td>
</tr>
<tr>
<td>Meeting non-functional requirements</td>
<td>5.56</td>
<td>5.63</td>
<td>0.07</td>
</tr>
<tr>
<td>Process efficiency</td>
<td>5.22</td>
<td>5.06</td>
<td>0.16</td>
</tr>
<tr>
<td>Project’s economic success</td>
<td>4.28</td>
<td>4.20</td>
<td>0.08</td>
</tr>
<tr>
<td>Product’s economic success</td>
<td>4.61</td>
<td>5.14</td>
<td>0.53</td>
</tr>
<tr>
<td>Quality of planning</td>
<td>5.89</td>
<td>5.26</td>
<td>0.63</td>
</tr>
<tr>
<td>Customer satisfaction (organisational level)</td>
<td>5.22</td>
<td>5.11</td>
<td>0.11</td>
</tr>
<tr>
<td>End-user satisfaction (individual level)</td>
<td>5.67</td>
<td>5.00</td>
<td>0.67</td>
</tr>
<tr>
<td>Contractor satisfaction (organisational level)</td>
<td>5.56</td>
<td>4.94</td>
<td>0.62</td>
</tr>
<tr>
<td>Project team members’ satisfaction (individual level)</td>
<td>5.22</td>
<td>5.11</td>
<td>0.11</td>
</tr>
<tr>
<td>Project transparency</td>
<td>5.94</td>
<td>5.51</td>
<td>0.43</td>
</tr>
<tr>
<td>Product’s adaptability and maintainability</td>
<td>5.78</td>
<td>5.34</td>
<td>0.44</td>
</tr>
<tr>
<td>Degree of technical novelty / Learning effects</td>
<td>4.72</td>
<td>4.91</td>
<td>0.19</td>
</tr>
<tr>
<td>Product’s contribution to customer’s strategic goals</td>
<td>5.33</td>
<td>5.80</td>
<td>0.47</td>
</tr>
<tr>
<td>Product’s degree of freedom from defects</td>
<td>5.89</td>
<td>5.54</td>
<td>0.35</td>
</tr>
</tbody>
</table>

Table 2. Comparison of ISPS dimensions’ relevance for fixed-price and time-and-material projects.

Our juxtaposition in Table 2 reveals that all dimensions were rated over 4.0 on average and no great discrepancies exist so far (cf. right column). As significant discrepancies can only be shown after enriching our sample and yet we aim to show first trends, we designated ratings as similar (blue) for mean value discrepancies < 0.1 and as different (orange) for discrepancies > 0.6, respectively. Accordingly, respondents rated the dimensions meeting non-functional requirements and project’s economic success similarly for both contract types. In addition, Table 2 shows that meeting functional requirements is considered the most important and project’s economic success the least important dimension regardless of contract type. Differences include that adherence to schedule, quality of planning, end-user satisfaction, and contractor satisfaction were rated more important in fixed-price projects.

Our general preliminary results (spanning all project characteristics) on the one hand show that certain dimensions are considered important regardless of specific project characteristics (e.g. meeting functional requirements and customer satisfaction). On the other hand, there are dimensions whose relevance varies depending on project characteristics, for instance adherence to schedule or quality of planning (cf. the contract type example above).

5 Discussion and Expected Contribution

In this article, we present our on-going research concerning the relevance of ISPS dimensions depending on specific project characteristics from the perspective of project managers. Preliminary results collected from 53 projects indicate that certain dimensions are consistently considered relevant regardless of project characteristics. These dimensions need to be considered generally important and thus used for measuring success in most projects. In turn, the relevance of other dimensions varies depending on project characteristics. These variations need to be taken into account – when success of specific projects is being measured – by adjusting the set of assessed success dimensions accordingly.
Although most differences in success dimensions’ relevancies between fixed-price and time-and-material projects in our example (cf. Table 2) are statistically not significant due to the (yet) rather low sample size, the tendency towards different success assessments is apparent. A further reason for the (preliminary) insignificance seems to be that the respondents tend to avoid rating dimensions at the bottom of the Likert scale. Overall, less than 8% of all ratings were on the two lowest points, with only one median value of 4, all others of 5-7. We believe the social desirability bias (Edwards, 1957) to be a plausible reason for this finding. According to this bias, individuals tend to answer the way they think they are supposed to – according to what others expect from them. IS project managers might not want to exclude any dimension as they otherwise risk to be suspected of (inappropriately) neglecting this dimension in projects. 

The described differences in Table 2 (cf. section 4) can be explained as follows. The indicated higher relevance of adherence to schedule and quality of planning for fixed-price projects is not surprising as it seems plausible that these dimensions’ relevance depends on the contract type: For a fixed-price project, it is reasonable to expect that project managers set value on high quality of plans in order to meet the schedule and budget of the project. It may be surprising in this regard that adherence to budget is rated rather similarly for both contract types (and not more important for fixed-price projects). A plausible explanation from our point of view is that keeping the schedule is considered more important than keeping the budget in most projects. It is not unusual that managers make use of additional resources to keep the planned schedule (which according to Brooks’ Law rarely works; cf. Brooks, 1995). With regard to the higher relevance of end-user satisfaction in fixed-price projects, we believe that product quality (which is important to end-users) may suffer due to shortcuts which arise from time pressure (Costello, 1984). Therefore, project managers might emphasize the satisfaction of end-users in such projects. The higher importance of contractor satisfaction in fixed-price projects may be explained with the fact that the contractor organisation bears the risks in this type of contract. 

Our study is a counterexample to success studies which do not differentiate between any characteristics of IS projects, using only adherence to planning (time, budget and requirements) to measure project success, for example the often cited Chaos Report (The Standish Group International, 2009). According to this report, considerably few projects are successful. We hope that our final results illuminate the role of adherence-to-planning dimensions depending on specific project characteristics. Our preliminary results indicate that the importance of single adherence-to-planning dimensions can vary among projects (cf. the adherence-to-schedule example above). Such variations need to be taken into account in order to measure ISPS adequately. Adequate ISPS assessment using a different set of dimensions for different types of projects might show that the IS project management crisis is not as serious as presented in the Chaos Report (The Standish Group International, 2009). 

We anticipate contributing to the large body of research on the measurement of ISPS by providing statements about the relevance of all potential success dimensions for each analysed project characteristic. Thus, we follow the call for developing situational models of ISPS (Dvir et al., 1998) and contribute situational models of ISPS concerning specific project characteristics. As such models indicate the relevance of success dimensions for certain characteristics, they enable scholars and practitioners to derive relevant dimensions for their IS projects. For the research community, we expect the use of situational models of ISPS to increase the validity of studies reporting on ISPS rates or using ISPS as dependent variable. Practitioners should be able to identify important dimensions for their specific projects, leading to more adequate assessments of project success and therefore more accurate decisions about future investments. 

As a first step, we investigate the impact of project characteristics on ISPS dimensions from the perspective of project managers. However, existing research suggests that it is important to consider ISPS from the perspective of various project stakeholders (Dvir et al., 1998; Karlsen et al., 2005). We agree with this view and encourage researchers to further investigate other stakeholders’ perspectives.
References


