

TIME, BUDGET, AND FUNCTIONALITY? – IT PROJECT SUCCESS CRITERIA REVISED

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Abstract

Every time the Standish Chaos report is issued, it provides pessimistic data according to which more than 60% of IT projects turn out to be challenged or failed. Small positive changes in these statistics over the years do not respond to the concurrent improvements in the fields of project management, IT knowledge and risk management. The purpose of this paper is to explore the determinants of the Enterprise Systems' implementation projects' success evaluation from the perspective of the adopting organizations, and to make a proposal of success criteria that are in line with perceptions of project success within these organizations by answering the following research questions:

- What criteria are used in the evaluation of a project success/failure?

- Is the alignment with the budget and/or schedule a determinant of project success perception within the organization?
- What criteria determine the project evaluation as a success or failure?
- How the context of the budget/schedule deviations from the plan affect the project success perception?

The empirical research is based on a mixed quantitative-qualitative approach.

Keywords

IT project success evaluation, project success criteria, empirical study

1. Introduction

For many years, researchers have quoted statistics of IT project failures included in the Standish Chaos Report (1995). Although the number of failed projects as reported by Standish has decreased over the years from 31% in 1995 to 24% in 2009, the percentage of these so-called ‘challenged’ projects still oscillates around 50%. In many publications, these figures have been summed, resulting in the conclusion that the completion of 60 to 80% of all projects is ‘endangered.’ On the basis of the aforementioned numbers, a so-called ‘software crisis’ was announced and, for some people, it still exists. However, some researchers and practitioners question its existence because the real world around us is full of valuable and reliable software applications. Such doubts were summed up by Glass (2006), who concluded that no answers are provided for questions about the Standish methodology and that ‘most research studies conducted by academic and industry researchers arrive at data largely inconsistent with the Standish findings.’ The purpose of this paper is to examine the relevance of ‘traditional’ project success criteria for the evaluation of complex IT projects, namely Enterprise Systems, from the perspective of the adopting organizations, and to make a proposal of success criteria that are in line with perception of project success within these

organizations. This is achieved by a literature overview within the scope of project success criteria, followed by an empirical examination of the relevance of these criteria in a mixed quantitative-qualitative approach.

2. Discussion on the currently used project success criteria

Standish results are criticized, among others, for unclear research methodology (Glass 2006), non-random sampling, incorrect interpretation of the results (Jørgensen & Moløkken, 2006) and ignoring the forecasting biases (Eveleens & Verhoef, 2010). Improving or changing the sample selection, population, respondents or data collection method may lead to significantly different results regarding the budget/schedule/functionality measures of IT projects (Gemino et. al. 2007, Sauer et. al. 2007). Accepting the fact that the results presented in the Standish reports may be biased due to the abovementioned reasons, this paper will concentrate on success criteria against which the projects are evaluated. The general question that drives the research presented in this paper is the following: provided that all methodology errors identified by the researchers are corrected, would the Standish report provide results consistent with project success perception within the IT adopters that are subject to the study? If not, what criteria should be used to reflect project success/failure perception in the adopting organizations? To answer these questions, the project success/failure criteria used in the Standish report are first identified and discussed.

The Standish definition of a failed project is a project that was cancelled or abandoned. This definition leaves no doubts; if a project did not start productively, or was abandoned short after the productive start, it should surely be treated as a failure. Challenged projects are defined as those, which:

- exceeded the budget,
- exceeded the schedule,
- did not supply the required functionality.

Standish uses the logical ‘and’ to connect the three above statements, though it is obvious that there should be an ‘or’ instead (Jørgensen & Moløkken, 2006; Gemino et. al. 2007). After making this correction, one would define a ‘challenged project’ as one that has not managed to satisfy one or more of the project success criteria, which is commonly referred to as the ‘iron triangle.’ In contrast, a ‘successful’ project would be one that meets all three criteria. In this way, one can obtain a logically consistent categorization of the projects. Nevertheless, the question of whether IT project categorization against the above criteria properly describes the phenomenon of project success needs to be addressed.

The literature on project management has criticized such criteria for a long time, considering them insufficient for the purpose of assessing the success of complex projects (Chan, Scott & Lam 2002, Baccarini 1999, Lim & Zain Mohamed 1999). A survey made by Karlsen et al. (2005) revealed that the highest ranked success criterion among Norwegian project managers was whether a system ‘works as expected and solves the problem,’ whereas the iron triangle criteria were ranked on positions 7, 8 and 9. A similar study among Australian construction industry project managers (Collins & Baccarini 2004) revealed that 53% of the respondents considered time, budget and quality to be insufficient criteria for project assessment. The ‘satisfaction of the client’ made up the most common additional criterion. It is important to notice that client satisfaction is a subjective opinion, in contradiction to the objective measures of the iron triangle. Cuellar (2010) concludes that project success may be considered to be objective, when it is represented by measurable constructs, like time, schedule and scope as well as subjective and relative, if multiple stakeholders’ opinions are taken into consideration. Thomas & Fernandez (2008) summarize that ‘it is widely accepted that success is a multi-dimensional construct; what is not agreed is which dimensions best represent success’ while Joosten et al. (2011) claim that restricting the success evaluation to the iron triangle is caused by problems with the measurability of further success dimensions.

It is therefore justified to develop IT project evaluation frameworks that go beyond the iron triangle.

Baccarini (1999) concluded that project success should be measured in two categories: product success, which involves meeting the customer's organizational expectations, and project (management) success, which involves satisfying time, budget and functionality criteria. The first category was considered to be more important. Another conclusion was that a project can be successful in one of the categories but unsuccessful in another. As already mentioned above, the project success definition may differ depending on the stakeholder, performing the evaluation (Atkinson 1999, Thomas & Fernandez 2008). Nelson (2005) indicated that different stakeholders (e.g., users, project managers, team members, sponsors and top management) are interested in different aspects of the project's success. The issue of users' criteria for evaluating an IT project as success forms a separate research topic that is widely covered by the literature regarding user acceptance (e.g., Davis, 1989, Venkatesh et al., 2003) and shall not be discussed in detail here. In this paper, the criteria will be examined from the perspective of project management and top management (including sponsors) of an adopting organization. According to Nelson, project managers tend to favor the iron triangle criteria, whereas the top managers are more interested in business outcomes. It is important to note that meeting functional requirements does not ensure the achievement of organizational goals or specific business outcomes. Shenhar, Levy & Dvir (1997) stated that poor project definition and weak articulation of the product requirements may result in a project that meets the specifications but does not provide a useful product. What is more, even if a product is useful, it may fail to provide business value to the organization due to the changing business environment or organizational strategy (Nelson, 2005). Eveleens & Verhoef (2010) made another finding that is crucial for assessing the project success criteria used in the Standish reports, namely that Standish compares the actual data only with the initial project forecasts

and does not account for the forecasting biases. According to these authors, different organizations have different forecasting routines. Some would show the lowest possible estimates, some would try to make their forecasts as exact as possible, and some others would steer towards the Standish criteria fulfillment and overestimate the project parameters such that all projects are always 'successful.' Regardless of the forecasting routines adopted by a given company, deviations of the actual values from the initial plan may also occur due to various reasons, and these reasons may affect the project assessment as a success or failure. A deviation from the plan may occur due to poor forecasting, may be the result of poor project performance or management and may also be caused by changes inside or outside an organization that could not be anticipated during the initial planning stages, just to name a few. In other words, as Eveleens & Verhoef summarized, 'the part of the project's success that's related to estimation deviation is highly context-dependent.'

Reassuming the above discussion, one can draw the following postulates for the practice of project evaluation:

P1: A project success should be evaluated within two aspects:

- product success – achieving the project's:
 - organizational goals, i.e., the project outcome fulfills its role in the organization,
 - business goals, i.e., the project outcome provides the expected value to the organization,
- project management success – satisfying the budget, time and quality/functionality criteria.

P2: Using the iron triangle criteria as an absolute measure of a project success is not a correct approach.

P3: The product success is a *sine qua non* to recognize a project to be successful.

P4: Project management success is less important than the product success in the overall evaluation of the project success .

P5: Project management success measurement should account for the context in which the deviations from the plan occurred.

Below, an empirical study will be presented to test the relevance of the above formulated postulates in the practice of implementations of Enterprise Systems (ES). Enterprise Systems implementation projects are a good example of a complex IT initiative as their scope covers most of the company's processes, their duration usually exceeds one year and they involve significant resources (e.g. Lorca & Andres 2011; Scherer-Rathje & Boyle 2012; Uwizeyemungu & Ramond 2010)

3. Empirical study

3.1. Methodology

Research questions and study design

To empirically test, whether the postulates for the project success evaluation, derived from the literature hold in a real-life environment, the research questions, depicted in Table 1 were posed. To answer the research questions, a mixed quantitative–qualitative approach was used, as discussed by Miles & Huberman (1994). The aim of such an approach was to obtain both generalizable results and a rich depiction of the phenomena being studied (Firestone 1987). The mapping of the research method to the research questions is shown in Table 1:

Table 1. Research questions

Research question	Research method
RQ1: What criteria are used in the evaluation of a project success/failure?	Survey
RQ2: Is the alignment with the budget and/or schedule a determinant of project success perception within the organization?	Survey
RQ3: What criteria determine the project evaluation as a success or failure?	Case study
RQ4: How the context of the budget/schedule deviations from the plan affect the project success perception?	Case study

By answering the above research questions one will be able to determine, whether the postulates for the evaluation practice, present in the literature, are valid in a real-life environment, as shown in Table 2:

Table 2. Research questions and literature postulates

Postulate derived from the literature review	Research question
P1: Project success should be evaluated within two aspects: product success and project management success	RQ1
P2: Using the iron triangle criteria as an absolute measure of a project success is not a correct approach.	RQ2
P3: The product success is a <i>sine qua non</i> to recognize a project to be successful.	RQ3
P4: Project management success is less important than the product	RQ2 and RQ3

success in the overall evaluation of the project success.	
P5: Project management success measurement should account for the context in which the deviations from the plan occurred.	RQ4

The next section presents the results of a questionnaire-based quantitative research study, conducted to obtain a general overview on the importance of project success criteria for adopting organizations. It is followed by an in-depth qualitative case study to provide richer details and interpretations of the findings.

3.2. Survey study

Survey design

An e-mail questionnaire survey was chosen as the research method for the first step of the study. The aim of the survey was to check what success criteria were used to evaluate IT (i.e., Enterprise Systems) projects – RQ1, and to what extent the iron triangle criteria determined the perception of success of the project – RQ2. A list of the success criteria was adopted from Karlsen et al. (2005), and the respondents were asked to rank each of them on a scale from 1 (unimportant) to 5 (most important). They could assign the same rank to more than one success criterion. The respondents were also asked if the project was a success in their opinion and in the opinion of the top management, whether it faced schedule and/or budget overruns and whether it had met the functionality requirements.

Survey sample

A population for the survey was defined as the ‘enterprises that made a major ES investment in the last 5 years in Poland.’ As no official list of such enterprises is available, a search was made on the web sites of Enterprise Systems’ providers and their implementing partners as a reference. The 22 web sites of SAP, IFS, Oracle and Microsoft Dynamics

vendors/implementing enterprises were analyzed. Additionally, a query was made among the professionals from the local consulting enterprises as well as doctoral studies candidates who were personally known to the author. As a result, an overall number of 138 enterprises was identified. As the sampling procedure was based on the search of the reference lists, all of the projects included in the sample were productive (i.e., there were no abandoned projects in the sample). An e-mail questionnaire was sent to these enterprises with a cover letter, asking a decision-maker in the project (e.g., project manager or steering committee member) for a response.

If an e-mail address of such a person was known, the questionnaire was sent to this person directly; otherwise, it was sent to the general e-mail address of an enterprise. A total number of 28 enterprises responded to the survey, and the majority of the respondents (20 out of 28) played the decision-making role in their projects as either the sponsor, member of the steering committee or the project manager. The other roles were that of team member (3), person not involved directly in the project (3), freelance consultant supporting the steering committee (1) and IT department specialist (1).

Survey results

The first step in the survey study was to replicate the study by Karlsen et al. (2005) on the significance of the success criteria.

The success criteria sorted by their assigned average rank are shown in Table 3.

Table 3. Success criteria average rank

Criterion	Average rank	Position
The solution is implemented in accordance with the budget	4.0	1
The system has high reliability	3.96	2
The solution contributes to the improved efficiency	3.86	3
Requirements are met	3.86	3
The system works as expected and solves the problems	3.82	4

The solution is implemented as scheduled	3.68	5
The solution contributes to realization of company's goals	3.36	6
Users are satisfied	3.07	7
The solution is profitable	2.29	8

Unlike the results by Karlsen et al., the traditional success criteria are ranked higher. They ranked 1, 3 and 5 in this study, whereas the report by Karlsen et al. considered these measures to be graded as 9, 7 and 8, respectively. The answer to the RQ1 is that on average, the responding organizations use both the project management criteria as well as the product success criteria, with project management being more important.

The second step was to determine to what extent the alignment with project management measures determines success perception (RQ2). As the sample was small, a Fisher's Exact Test was used to determine the association between the budget/schedule criteria fulfillment and success perception. As all the responding enterprises reported the achievement of the required functionality, this aspect could not be tested.

The research hypothesis was as follows:

H1: An overrun in budget and/or schedule does not impact the success perception of a project.

The null hypothesis was as follows:

H0: An overrun in budget and/or schedule impacts the success perception of a project.

The Fisher's Exact Test results are shown in Tables 4 – 6:

Table 4. Fisher's Exact Test for success perception vs. budget criteria

Budget overrun	Perceived success		Total
	No	Yes	
No	1	14	15

Yes	2	11	13
Total	3	25	28
Fisher's Exact Test p=0.444			

Table 5. Fisher's Exact Test for success perception vs. schedule criteria

Schedule overrun	Perceived success		Total
	No	Yes	
No	0	13	13
Yes	3	12	15
Total	3	25	28
Fisher's Exact Test p=0.139			

Table 6. Fisher's Exact Test for success perception vs. schedule or budget criteria

Schedule or budget overrun	Perceived success		Total
	No	Yes	
No	0	6	6
Yes	3	19	22
Total	3	25	28
Fisher's Exact Test p=0.470			

The test results indicate that the null hypothesis should be rejected, which means that there is no significant association between the budget/schedule criteria and project success perception. The above results lead to an interesting answer to RQ2: although the companies being subject to the study highly valued the classic project management measures, they did not perceive the alignment with a budget and schedule as valid success criteria, providing that functional requirements were met.

The survey study gives also a partial answer to the RQ3: the schedule/budget excess does not determine the project evaluation as a failure.

There must be some circumstances not revealed in the survey study that influence success perception and/or justify the budget/schedule overruns in the eyes of decision makers in organizations.

The summary of the conclusions from the survey study are as follows:

1. The companies being subject to the survey highly value both product and project management success criteria, which supports postulate P1.
2. Although the companies subjected to the survey study highly value the iron triangle measures, they do not perceive two of them (budget and schedule) as major project success criteria. This finding supports postulates P2 and P4.

To shed more light on project success perception and to determine a more relevant set of success criteria, an in-depth analysis was performed involving three case studies.

3.3. Case study

The following section presents a case study of three enterprises that conducted the Enterprise Resource Planning system (ERP) implementation projects.

Case study may be used with any philosophical perspective: positivist, interpretivist or critical (Dube & Pare 2003). This case study takes the positivist stance and aims to test the predictions from the theory, formulated in the above sections as literature postulates as well as expand the existing theory by making a proposal of success criteria that are in line with perceptions of project success within the examined organizations.

Following the guidelines of Eisenhardt (1989) and Dube & Pare (2003), the research design (blueprint) is first described and followed by results from the case study.

A case study blueprint should include the following (Dube & Pare 2003; Yin 2003):

- Clear research questions, and (optionally) propositions,
- Unit of analysis,
- Selection of cases,
- Data collection methods,

- Elucidation of the data analysis process: logic linking the data to the propositions and criteria for interpreting the findings.

Case study approach and research questions

The survey study revealed that the organizations, being subject to the study do not perceive the iron triangle measures (e.g., namely budget and schedule) as main project success factors and that projects with similar iron triangle parameters may be treated either as failures or successes. These findings yield to another questions, which are:

RQ3: What criteria determine the project evaluation as a success or failure?

RQ4: How the context of the budget/schedule deviations from the plan affect the project success perception?

To answer them, a holistic and in-depth investigation of the projects has to be conducted. According to the IS research methodology literature review made by Dube & Pare (2003), the case study is the most appropriate approach for that purpose. According to Iacono, Brown & Holtham (2009) case study, is the most common qualitative method used in Information Systems and ‘is particularly suited to the study of IS when the focus is on organizational rather than technical issues,’ which corresponds to the aim of this study. The common criticism of the case study approach is the lack of generalizability. Lee & Baskerville (2003) refuted this argumentation by stating that statistical generalizability, commonly referred to as the only one, is actually just one of the many ways to generalize the research findings. Other possibilities include the generalizability of the empirical descriptions included in the case studies to theory.

Unit of analysis and selection of cases

A review of case studies in the area of Information Systems made by Dube & Pare (2003) revealed that 60 percent of all studies included a single case, while the remaining 40 percent

‘adopted a multiple case design strategy.’ As such, a second approach was introduced in this study to broaden the empirical evidence. The units of analysis were Enterprise System implementation projects which exceeded one or more of the iron triangle success criteria.

The selection criteria were as follows:

- The range of projects was limited to those in which the author participated. The observations made during the projects were supposed to balance out the responses provided by the project managers and thus provide an objective picture of the project.
- Based on the responses included in the questionnaires, two projects were selected. Although the budget and/or schedule were exceeded in the selected projects, such disturbances did not hinder the project being considered a success by the project manager and the top management. Such a setting allowed the analysis of the criteria besides the iron triangle that influenced success perception;
- To confront the findings, a third project with similar schedule/budget overruns but was nevertheless considered a failure was added to the research.

Case study data collection

According to Yin (2003: 85) the most commonly used sources of evidence in the case study are documentation, archival records, interviews, direct and participant observation and physical artifacts. Out of these sources, the following were used in the present study:

- longitudinal participant observation,
- project documentation,
- interviews with project managers (both structured and unstructured).

A longitudinal participant observation was the primary source of evidence. The author, participating in the projects as a freelance consultant, was not an employee of any of the three consulting enterprises conducting the projects. Therefore, he had no influence on the project

management practices and did not actively participate in the project management process. Being the consultant in one out of the 4-5 areas, he had also limited influence on project performance and the final results. This limited any possible bias due to the investigator's manipulation of events (Yin 2003: 86).

Because the observer was a 'real' part of the project team, the other members did not feel as though they were being observed, which reduced the reflexivity bias (Yin 2003: 86). Participation in the current project works, as well as status meetings with project management and other consultants, was a source of in-depth information regarding the project management practices as well as the team members' attitudes towards the phenomena of project success perception, criteria and related factors.

'Real' engagement in the project as a consultant could lead to another type of bias, namely, the impact of a researcher's own beliefs (Iacono, Brown and Holtham, 2009). Being part of the consulting team could result in the researcher's taking the stance of one of the two parties involved in the implementation. This bias was difficult to completely eliminate; however, several steps were taken to minimize its influence on the research outcome.

To objectivize the author's view, questionnaires were sent to project managers of the adopting organizations. The questionnaires had structured forms and opened with a question asking whether the project was considered to be successful by the respondent, the management team and the system users. Then, the project managers were asked to rank the project success criteria based on Karlsen et al. (2005) from 1 to 5, where 1 meant 'insignificant', while 5 indicated 'extremely significant.' They were also asked whether the criteria were ultimately reached. They also had the possibility of adding other success criteria in case the supplied list was not comprehensive in their opinion. Other questions concerned changes in the project scope, schedule and budget as well as reasons for such changes. To enhance the quality and accuracy of the obtained information, subsequent interviews were held with the project

managers. Questions were constructed on the basis of the answers provided in the questionnaires and were designed to shed more light on the factors causing deviations from the initial project plans. The questionnaires were filled out by project managers from all three organizations, and interviews were held with project managers from organizations 1 and 2. Data collection was completed by the examination of documents such as the schedules, the Steering Committees' notes and project finance reports.

Case study data analysis process

To structure the data analysis process and be able to determine the context of the budget/schedule deviations, the projects, being subject to the case study, were evaluated against the project success factors, derived from Nelson (2007), Kappelman, McKeeman and Zhang (2006) and the list published by the Standish Group (a combination of the two lists was used, derived from: Johnson et. al. 2001 and Hartmann 2006).

The analysis of the project success factors allowed to group them into five main groups (analysis areas):

- Project Planning,
- Top management support and project management,
- Contractor and personnel,
- Project scope,
- Technical issues.

None of the enterprises faced problems with the technical side of the project, so this group of success factors was omitted in the case study.

Evidence from each case was analyzed to determine how the project was performed in each of the above areas and what errors were made comparing to the model situation, depicted in the literature. After determining what caused the deviations from the plan (context), it was

possible to confront these findings with the success perception of the project and therefore answer the research questions.

The results of the case study are presented in the following sections.

Project 1 - Chemicals producer

Project no. 1 involved the implementation of an ERP suite in a holding company dealing with chemicals manufacturing and retail. The project setup was standard for this type of project; internal implementation teams were appointed, and an external consulting company was hired to fulfill the obligations of the main contractor. Consultants and implementation teams cooperated to develop a solution blueprint, configure the system, and test and deploy the final solution. The solution has now been productive for four years and is considered a success by the adopting organization.

Project success criteria

The project manager (PM), in discussing the success criteria, pointed to only one as an extremely important criterion, by stating that 'IT enables the achievement of the company's goals.' Two other criteria were ranked to be very important: 'high system reliability' and 'functional requirements met.' 'Implementation within the budget' and 'implementation within the schedule' were ranked as having medium importance (rank 3). The PM explained it by stating, 'the main purpose of IT, as our company perceives it, is to support the achievement of the company's goals. Our President says that the only thing stable in our environment is a change, which reflects the situation in the company. We were, we are and will be in the process of constant changes. Consequently, the company's goals are also subject of change. If these goals change during the implementation of an IT project, the project's scope needs to be redefined and this situation obviously results in exceeded schedule and budget.' The three criteria ranked as extremely and very important were met, but the implementation was not

finished either within the initially planned schedule or budget. The budget overran by 120%, and the schedule was extended 24 months (100%).

Determinants and assessment of budget/schedule deviations from the plan

Project Planning

Before the main project began, two initial phases were deployed. The first one, performed by the local consulting enterprise, aimed to establish the general requirements by shaping the project scope and selecting the Enterprise System to be implemented, as well as the main contractor. At this stage of the project, requests for quotes were sent to potential contractors. The implementation scope included the implementation of the requirements as specified in the request for quotes in two companies of the holding. The budget and the schedule for the project was estimated on the basis of the offers that were placed. The project plan was performed carefully and with the use of the industry standards. No project planning errors that could cause future deviations from the plan were identified.

Top management support and project management

As the project manager was designated from the IT department of an adopting organization, the Steering Committee delegated the CFO to help him with the business issues in the project. Each of them had more than 10 years of experience in working within the enterprise. The project manager had experience in conducting the complex IT projects and the CFO had a strong position in the organization and thus helped in resolving a lot of political issues in the project. The Steering Committee itself included the President of the organization and all of the top managers of the company. The President placed a very high priority on the project and included its successful completion into the business targets of all of the managers, which meant that their assessments and bonuses depended on the success of the project. Not involving himself into the current project issues, he however reacted whenever any internal resistance or political issue surfaced in the organization. Therefore the project had proper

sponsorship from the top management and did not suffer from political issues. Also the project management team was chosen properly.

Contractor and personnel

The main contractor was one of the biggest IT companies in the country in terms of revenues and market share. To strengthen the implementation team, a medium-sized enterprise that specialized solely in the implementation of the Enterprise System was engaged in the project as a subcontractor. The implementation team consisted mostly of experienced consultants, with six or more years of experience in the field; no problems associated with the implementation team were reported. The key users were motivated and performed all the tasks assigned to them in the implementation contract.

No contractor failure that could cause serious deviations from the plan was identified.

Project scope

The project faced a significant change in the functional scope. Additional questions, asked during the interview with the project manager, shed more light on the circumstances that resulted in such an effect.

The first phase of the project was accomplished on time and within the budget. However, during the subsequent implementation work, a business decision was made to set apart three new branches from the enterprise and cover them with the new system. The project scope had to be redefined to satisfy the new business requirements. The project manager stated, ‘the project that was finally developed is completely different from the one that had been planned. We could not, however, anticipate the business changes in the project as the decisions were made after the project had started. So the project had to be adjusted to the new business environment. This task was successfully completed and this is what is considered to be the main success. If we did the project in accordance with the initial scope and schedule we

would obtain a product completely useless for the new organization. And this would be a failure.’ The main reason for the schedule and budget excesses was the increase in the functional scope of the project, caused by the business change, which occurred during the project execution. As it was stated above, the top management of the enterprise, as well as the project manager, considered this change as a necessary one and thus the functionality/schedule/budget overruns were considered as justified. They did not affect the project perception as a success.

Project 2 – Financial institution

Project 2 was conducted to support the back-office processes of the financial institution with an ERP system. It was assumed that an internal implementation team would cooperate with the external consultants to develop a solution blueprint, configure the system, and test and deploy the final solution. The solution has been in use for two years and is considered a success by the adopting organization.

Project success criteria

The project manager selected the following success criteria as those with the greatest importance:

- high system reliability,
- functional requirements are met,
- implementation in accordance with the schedule.

The following criteria were ranked as very important:

- a solution that contributes to improved efficiency,
- implementation in accordance with the budget,
- and ‘IT that enables the achievement of the company’s goals’

The PM justified the selection by stating that ‘the enterprise, being very formal, appreciates the ‘standard’ project management criteria. The sole exception in this project there was the budget criteria. It was the first big IT project for the back-office and we had no experience required to estimate the amount of work to be done by our employees to complete the task. The contract concluded with the contractor clearly specified the work split between the parties but we anticipated that our employees might not be able to do all the work required. The time criterion had to be met due to formal reasons, so we allowed budget extensions to compensate some of the internal work.’ The project manager reported accomplishing all of the above criteria except the ‘implementation in accordance with the budget.’

Determinants and assessment of budget/schedule deviations from the plan

Project Planning

The project was initiated with the analysis phase, which was conducted by a local medium-sized consulting enterprise. The analysis included business process modeling and the gathering of information systems requirements. The resulting document served as a basis for requests for quotes. After the system and the main contractor were chosen, the requirements were incorporated into the contract, and the initial project plan was prepared on the basis of the results of the analysis. Therefore, no project planning errors that could cause future deviations from the plan were identified.

Top management support and project management

The adopting organization’s project manager was an experienced IT manager. As the organization maintained close relations between the business and its IT department, she was familiar with all major business issues within the organization. The Steering Committee included a member of the company board as well as all of its top managers. The Steering Committee supported the project manager during all of the crucial moments of the project.

The project had proper sponsorship and project management.

Contractor and personnel

The contractor was an experienced consulting enterprise and had delegated some of its best employees to work on the project. As such, it had no problems with fulfilling the contractual obligations. The project teams consisted of the department managers and the best employees from each department. Although the organization could be characterized as a bureaucratic rather than a business-oriented one, the key users were well motivated and contributed enough effort during the analysis phase of the project. However, during the productive start of the preparation phase, considerable resistance was observed among the key users. During this phase, according to the contract, the key users were supposed to actively test the system, prepare the user manuals and train the end users; however, they tried to avoid these tasks. The project manager, together with the Steering Committee, decided that forcing the key users to perform the required tasks would be risky because the lack of commitment would result in a low quality of work and thus jeopardize the productive start of the system. Instead, the project manager of the adopting organization decided to redirect most of the work to the consultants. The key users tested the system with the help of consultants, but the user manuals and end-user training were completed solely by the consultants. This, of course, required additions to the budget that were granted to the project. The shift of the work split between the contractor and the adopting organization, caused by the user lack of expertise and resistance was the main determinant of the budget exceeding by 15%. As for the enterprise's implementation teams, this was their first-ever IT project, they had problems in estimating the extent of work and necessary skills required to complete some of the tasks. So during the project planning some standard assumptions for that kind of projects were made, regarding the work split between the project parties. These assumptions proved to be unfeasible in the real-life circumstances of this particular enterprise. The project management team had to change the

initial assumptions to complete the project successfully. The budget overrun was considered to be justified and did not affect the success perception of the project.

Project scope

The requirements were stable for a 2-year-long project. They were extended by 10-15%, and 10-15% of the existing requirements were modified during the implementation. At the same time, 5-10% of the initial requirements were excluded from the project during the implementation process. The aforementioned shifts were caused, in the project manager's opinion, by the users' lack of knowledge about system functionalities during the requirement designing phase, consultants' misunderstanding of business requirements and minor changes in the organization's strategy during the project (as it lasted almost 2 years). As the project was being performed on a fixed-price basis and the extent of the project scope changes was acceptable to the contractor, both the budget and schedule criteria could be met. *The change of the project scope was not a determinant of the budget/schedule overruns.*

Project 3 – Wholesaler

Project 3 involved the implementation of an ERP suite by a wholesale enterprise. An international consulting enterprise with a strong local presence was chosen as the implementation partner. It was assumed that an internal implementation team would cooperate with the external consultants to develop a solution blueprint, configure the system, and test and deploy the final solution. The initial schedule assumed the project to start within a year. The solution has been in use for 3 years and is today considered a failure by the adopting organization.

Project success criteria

The project manager selected the following criteria as being very important:

- high system reliability,

- functional requirements met,
- implementation in accordance with the budget,

No criteria were marked as extremely important, although the project manager added three more criteria that were not included in the original questionnaire. These were as follows:

- replacement of the existing system with a modern ERP suite,
- business process improvement and unification,
- improvement of the decision-making process.

The added items are, in fact, business-related project goals rather than success criteria. They could be classified under the criteria by Karlsen et al. (2005) as a situation where ‘the system works as expected and solves the problems.’

The project manager reported that only the ‘high system reliability’ criterion was met. He also stated that implementation led to the unification and improvement of the business processes within the organization. The comparison of the system configuration with project business blueprint proves, however, that functional requirements were also met.

Determinants and assessment of budget/schedule deviations from the plan

Project Planning

Before the start of the main project, a requirement analysis was performed by the local consulting enterprise with a firm position in the market. The resulting document served as a basis for choosing the system and the main contractor as well as a basis for estimating the budget and schedule. The planning routine did not differ from the ones applied in the two preceding cases. Therefore, a conclusion can be drawn that no project planning errors in the initial stage of the project were made, that could cause future deviations from the plan.

Top management support and project management

The company's CEO did not place enough attention on the project and left it in the hands of the project manager, who was a newly employed IT specialist. Being new to the organization, he had neither the power in the organization nor enough knowledge to appoint the right people for the project and maintain their involvement in the project activities on the level that could assure their proper execution. Lack of top management support and weak project management was one of the determinants of the project measures deviations from the initial plan.

Contractor and personnel

A medium-sized international consulting company with a strong local presence was chosen as the main contractor. All consultants assigned to the project had six or more years of experience in the field. Lack of contractor's competence was therefore no reason for project failure. At the same time, the adopting organization faced problems with the completion of its implementation team. As the enterprise was short on staff and the key users were overloaded with their current work, they delegated less experienced employees to the project. It soon became clear that these people lacked enough knowledge to clearly express the implementation goals and the detailed requirements for the system. Furthermore, they also were overloaded with their day-to-day responsibilities and could not commit enough time to the project. The consultants had to wait for up to two weeks for meetings or simply to obtain information required to proceed with the work. After so long breaks between the meetings, the participants often did not remember what was already accomplished, and the same steps often had to be repeated. Low personnel involvement and skills was one of the determinants of budget/schedule excesses. In the meantime, the consulting enterprise also faced serious problems. Some of the consultants left the enterprise and had to be replaced by new ones. Even those consultants who remained were highly unmotivated due to the lack of proper project management. They engaged themselves in other projects, and their availability was

limited. Lack of contractor's involvement and personnel rotation was another reason for budget/schedule excesses.

Project scope

After a year, the project was in a state that was hard to describe using project management measures. The prototype was ready and consistent with the requirements specified during the analysis phase. However, due to the lack of engagement in the previous phases, the users could not assess whether the system met their needs. The same issues were discussed over and over again, and the system configuration was altered continuously. Finally the project was launched after a year-long delay. According to the adopting organization's project manager, however, it did not meet the company's requirements and was considered a failure.

The comparison of the system configuration with project business blueprint proves, however, that functional requirements, included in the specification were also met. The problem was that system specification did not reflect the real requirements of the business. This was caused by the personnel problems described above. Inconsistency between the project scope described in the system specification and the real requirements of the business was both the determinant of the budget/schedule deviations (due to many repetitive changes of the same functionality in the system throughout the project) and the determinant of the system perception as a failure.

Summary and conclusions from the case study

The research questions posed in the case study were:

RQ3: What criteria determine the project evaluation as a success or failure?

RQ4: How the context of the budget/schedule deviations from the plan affect the project success perception?

Regarding the RQ3, the empirical data on the achievement of the success criteria, derived from the case studies, are summarized in Table 7.

Table 7. Case study success criteria

Project	Business goals	Organizational goals	Functionality	Budget	Schedule
1	Met	Met	Adjusted to meet organizational goals	Exceeded due to functionality change	Exceeded due to functionality change
2	Met	Met	Met	Exceeded due to shift of responsibilities between the project parties	Met
3	Not met	Not met	Met (but inconsistent with the organizational and business goals)	Exceeded due to poor project management and lack of personnel involvement/knowledge	Exceeded due to poor project management and lack of personnel involvement/knowledge

The answer to RQ3 is thus following: for the organizations, being subject to the study, the achievement of business and organizational goals is the determinant of perceiving a project

as a success. The necessary condition for accomplishing these goals is the fulfillment of functional requirements of the project and, what is more important, alignment of the functional requirements with the business and organizational goals.

This supports, to some extent, postulate P3: product success is a *sine qua non* in recognizing the project as a success. In case 3, product success was not achieved even though the functional requirements were met, and the project was considered to be a failure. However, this project faced more problems that could also have affected success perception. To fully support postulate P3, one should find a project that met all of the project management success criteria but still was not considered as successful by the stakeholders.

The evidence supports postulate P4 in that project management success is subordinate to the product success. Both projects from cases 1 and 2 were considered to be successes despite functionality, budget and schedule-related deviations from the initial plans.

The case study also revealed some interesting findings regarding RQ4, regarding the influence of context of the deviations from the plan on the success perception. The evidence from the case study shows that if changes in functionality, budget and/or schedule are observed as reactions to changes in project circumstances that could have not been predicted during the initial planning phase, the project can still be considered successful provided that the product success criteria were met. Inconsistency between the project scope and business requirements as well as project management failures (like lack of user involvement, weak project management) affect the success perception as a failure. Another finding is, that in the companies, being subject to this study, the criteria determining the project evaluation as a success/failure depend on the corporate values of the organization. This fact was explicitly emphasized by the project managers of Projects 1 and 2.

4. Discussion on the new project success measures

The first aim of this paper was to explore the determinants of the Enterprise Systems' implementation projects' success evaluation from the perspective of the adopting organizations, by answering the research question, summarized in Table 8:

Table 8. Summary of the results

Research question	Results of the study
RQ1: What criteria are used in the evaluation of a project success/failure?	The responding organizations used both the project management as well as the product success criteria.
RQ2: Is the alignment with the budget and/or schedule a determinant of project success perception within the organization?	The alignment with the budget and/or schedule was not a determinant of project success perception in the responding organizations.
RQ3: What criteria determine the project evaluation as a success or failure?	For the organizations, being subject to the case study, the achievement of business and organizational goals (product success) is the determinant of perceiving a whole project as a success.
RQ4: How the context of the budget/schedule deviations from the plan affect the project success perception?	If the deviations are observed as reactions to changes in project circumstances that could have not been predicted during the initial planning phase, the project can still be considered successful provided that the product success criteria were met. Inconsistency between the project scope

	and business requirements as well as project management failures (like lack of user involvement, weak project management) affect the success perception as a failure.
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The answers to the research questions, presented above, support the postulates for the project success evaluation, available in the literature as shown in Table 9:

Table 9. Verification of the literature derived postulates

Postulate derived from the literature review	Related research question	Postulate confirmed Y/N
P1: A project should be evaluated within two aspects: product success and project management success	RQ1	Y
P2: Using the iron triangle criteria as an absolute measure of a project success is not a correct approach.	RQ2	Y
P3: The product success is a <i>sine qua non</i> to recognize a project to be successful.	RQ3	Y
P4: Project management success is less important than the product success in the overall evaluation of the project .	RQ2 and RQ3	Y
P5: Project management success measurement should account for the context in which the deviations from the plan occurred.	RQ4	Y

Summing up, a set of more comprehensive project success measures, which would take into account the findings presented above should be developed to reflect the success perception within the organizations undertaking these projects. The Standish Group itself has started to recognize the necessity for more extended assessments of such projects. Although the initial Standish Chaos Report did not include any further assessment and simply assigned such projects to the ‘challenged’ category, J. Johnson of Standish (in: Hartmann 2006) called for common sense in project assessment by entering an elementary question into project assessment procedures: ‘how would a reasonable person categorize this project?’ The research conducted in this study allows one to specify what criteria should be used for the assessment of success of an IT project.

Cases 1 and 2 presented in this paper highlighted some situations in which the project was still considered as successful despite budgetary and schedule-related excesses. Examples included reactions to changes in the business environment and adjustments of the plan to real-life circumstances. Nevertheless, the project’s functionality, budget and schedule may also be affected by factors broadly recognized to be causes for project management failures, as was the case for project 3. There are many examples and different taxonomies of the failure factors related to project management in the literature (Al-Ahmad 2009; Glaser 2004; Nelson 2007; Tesch et. al. 2007, Spolsky 2007). Functionality, budget or schedule-related deviations caused by these factors should be treated differently than the ones discussed above.

Summing up the above discussions, the following conclusions can be made:

1. The project’s scope can change due to the following:
 - a. Reactions to business changes in the project’s environment.
 - b. Reduction of uncertainty during project execution.

- c. Project management failures.
2. The budget and/or schedule can increase due to project scope re-definitions, which result from business changes that could not be anticipated during the initial project planning phase.
3. The budget and/or schedule can increase due to uncertainty during the project planning phase that could not be eliminated (e.g., the involvement of the project participants was lower than expected in the initial project plan).
4. The budget and/or schedule can be exceeded due to project management failures mentioned above.

Taking the above statements into account, the projects can be categorized as follows:

1) Successful projects, which meet the following criteria:

- a. business/organizational goals met (i.e., product success) and
- b. functionality/schedule/budget met, or
- c. functionality/schedule/budget adjusted for uncertainty (e.g., business change and project planning);

2) Challenged projects, with the following criteria:

- a. business/organizational goals met and
- b. functionality/schedule/budget overruns due to improper project management;

3) Failed projects, defined as follows:

- a. did not meet business/organizational goals,
- b. regardless of the project management criteria (met or not met)

Although the above classification of projects is based on more relative criteria than the ones used by the Standish report, the evidence presented in this paper proves these criteria to be more consistent with project success perception in participating organizations.

The results of the study confirm the propositions, derived from the existing literature, that iron triangle criteria are not sufficient to evaluate the success of an IT project and that product success is considered to be more important than project management success. The limited use of other success criteria due to measurability problems may be overcome by adding the context analysis, as described above.

5. Limitations of the study

Both the survey and the case study were based on a limited sample and thus cannot be treated as fully representative. The description of a methodology used in this research allows other researchers to repeat the study on a larger (or different) sample to confirm the findings. However, the use of a mixed quantitative-qualitative research method enabled an increase in the reliability of the findings in comparison to using only one of these approaches.

The study was done among Polish enterprises and therefore cultural/regional bias may be present. It would be beneficial to repeat the study in other cultural settings. Also the fact that one type of IT project (Enterprise System implementation) was studied may impact the results. The complexity of ES implementation projects and their high impact on operational processes of an enterprise may cause higher tolerance to schedule/budget overruns than for less complex project.

6. Conclusions

The purpose of this paper was to explore the determinants of the Enterprise Systems' implementation projects' success evaluation from the perspective of the adopting

organizations, and to make a proposal of success criteria that are in line with perceptions of project success within these organizations.

The survey study revealed that although the examined organizations value project management criteria, they do not perceive them as determinants of the success perception. Most of the projects examined had exceeded at least one of the project management criteria and were still considered to be successful. The case study allowed the identification of additional project characteristics that influenced their assessments as successes or failures. It was revealed that if the project parameters (i.e. schedule, budget, and functionality) differed from the initial plan due to the adjustment of the project with the changing environment (whether it was external or internal to the project itself), the project would still be considered a success, provided that the adjustment guaranteed the achievement of organizational and/or business goals. This allowed the preparation of a proposal of project success criteria that would account for the above findings.

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