



A survey on the characteristics of projects with success in delivering client benefits



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ABSTRACT

Context: A large waste of resources in software development projects currently results from being unable to produce client benefits.

Objective: The main objective is to better understand the characteristics of successful software projects and contribute to software projects that are more likely to produce the planned client benefits.

Method: We asked 63 Norwegian software professionals, representing both the client and the provider role, to report information about their last completed project. In a follow-up survey with 64 Norwegian software professionals, we addressed selected findings from the first survey.

Results: The analysis of the project information showed the following: i) The project management triangle criteria of being on time, on budget, and having the specified functionality are poor correlates of the essential success dimension client benefits. ii) Benefit management planning before the project started and benefit management activities during project execution were connected with success in delivering client benefits. iii) Fixed-price projects and projects in which the selection of providers had a strong focus on low price were less successful in delivering project benefits than other projects. iv) Agile projects were in general more successful than other projects, but agile projects without flexible scope to reflect changed user needs and learning, or without frequent delivery to the client, had less than average success in delivering client benefits.

Conclusions: The software projects that were successful in delivering client benefits differed from the less successful ones in several ways. In particular, they applied benefit management practices during project execution, they avoided fixed-price contracts, they had less focus on low price in the selection of providers, and they applied the core agile practices - frequent delivery to the client and scope flexibility.

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1. Introduction

The high investment in software-based products and services together with the frequent failures of software development projects [1–5] imply that even small improvements in process and product performance would amount to great savings. Better knowledge about the factors that separate successful and failed software projects, as well as the use of this knowledge to improve industry practices are essential to achieve such improvements.

The importance of improving software development performance has led to numerous surveys on failure factors of software projects [6–13]. One of the earliest surveys on software project failure, conducted in 1967 and reported in [14], found that lack of support from top management, lack of competent software professionals, changing technology, changing user requirements, and

insufficient project management were key failure factors. Interestingly, the failure factors of the early surveys on software project failures, such as the survey in [14], appear to be very much the same as those reported in more recent surveys on software projects. The 2012 McKinsey–Oxford survey [15], for example, reports that unclear objectives, lack of business focus, shifting requirements, technical complexity, an unaligned team, lack of skill, unrealistic schedule and reactive planning are the failure factors of software projects. In spite of the 45-year separation, with ample opportunities to learn from experience, it seems that software projects fail for very much the same reasons as in the early days of software development.

Although we may have had information about why software projects fail for a while, the step from knowing *why* to knowing *how* to improve the situation is challenging. To accomplish this, we need to understand the practical actions likely to reduce the risk of failures. Unfortunately, the empirical research on actions likely to improve the rate of software project successes is much less

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comprehensive. This hampers the software industry's opportunity to be evidence-based when adopting new software development methods and project management strategies [16,17].

This paper aims to contribute to the body of empirical knowledge on the characteristics of successful software projects, that is, to examine which actions and contexts are connected with a higher likelihood of software project success. We emphasize action and context elements with the potential to guide future projects and improve the likelihood that a project is successful in delivering the expected client benefits. In particular, we address project size, benefit management, client competence and involvement, contract type and agile practices. There is, to our knowledge, only limited empirical evidence on how these elements affect the client benefits of software projects. In particular, there is a lack of evidence about which elements of benefit management and agile practices that, if any, are the key client benefit success factors.

There is much research on how project characteristics are connected with the traditional “project management triangle” of success - defining success as being on time, being on budget and having the specified functionality. Our results contribute to the body of knowledge by focusing on the success dimension typically neglected in software engineering surveys: client benefits. The importance of including this project success dimension in the analysis of characteristics of successful software projects is demonstrated by the low correlation of the client benefit success dimension with the other success dimensions found in our survey. The finding that a software project is on time, on budget and has the specified functionality is consequently far from a guarantee that the project is a success from the viewpoint of the client.

The remaining parts of the paper are organized as follows: Section 2 gives brief summaries of previous work on the topics addressed in the survey, Section 3 describes the design of the survey, Section 4 reports the results from the analysis of the collected data, Section 5 discusses the results, Section 6 discussed the limitations, and Section 7 concludes.

2. Previous work

Previous work on software projects reports widely different success and failure proportions. This is to a large extent a consequence of a difference in the definitions of project successes and failures. When using the narrow definition that a failed project is one that is “aborted” or “cancelled”, the proportion of failed projects is reported to be around 10% [4-6]. When including projects that are either cancelled or get a very low score on one or more performance criteria the proportion increases substantially. The survey in [6], in which a project was defined as failed if it got the score “poor” or “fair” on four out of the five performance criteria (user satisfaction, ability to meet budget targets, ability to meet schedule targets, product quality and staff productivity) found a failure rate of 26%. The analysis of the nearly eight hundred thousand small outsourcing projects reported in [18] gave that 14% were either cancelled or had a client rating of “poor” or worse. Defining as failure every project that does not deliver the specified functionality, is over budget or is not on time characterizes the majority of all software projects - typically 50–80% - as failures [19]. In any case, it is well documented that the software industry has a substantial proportion of software projects that are not fully successful.

Numerous empirical studies and reviews exist on factors believed to contribute to a software project's success, see for example [20-26]. These studies typically point to perceived success factors related to collaboration with and competence of the client, team skills, change and scope management processes, management support, planning and budgeting. In spite of the high number of studies on this topic, there has not been much empirical work that

focused on the characteristics of software projects successful in their main purpose, namely to benefit the client. It has long been pointed out that a software project's success is to a large extent dependent on whether the project manages to deliver the expected benefit to the client [27]. Nevertheless, surveys of software projects still tend to focus on success understood as being on time, being on budget and having the specified functionality, see for example [28]. In addition, there is, to our knowledge, a lack of surveys and data analyses on the correlation between different success dimensions of software projects. Studies from other types of projects suggest that the correlations between the project outcome dimensions budget control, time control and functionality as specified, and the client benefit outcome dimensions client satisfaction and business benefits, are very low [29,30]. This suggests that the software engineering studies with a focus on budget control, time control and delivered functionality cannot be used to say much about the degree of client benefits.

It is frequently reported that longer-lasting [31] and higher-cost [4] IT projects are less successful than shorter and smaller projects. The complexity and coordination needs of software projects typically increase with their length and size, which consequently increase the risk of project problems. Larger projects have, on the other hand, occasionally been reported to be subject to economies of scale, see for example, [32], and lower cost overruns, see for example, [33]. Possible reasons for the conflicting results of the effect of project size on success, when success is related to cost and time overruns, are discussed in [34]. A confounding factor of many cost and time overrun analyses is that when a project gets into trouble it also lasts longer and costs more. In other words, it difficult to separate the extent to which a larger and longer-lasting project experiences more time or cost overrun because it is large from the extent to which it becomes larger and longer-lasting because it experiences more time or cost failure. When measuring project size as the *actual* cost or duration we may consequently exaggerate the effect of project size on lack of success. If project size is measured as the *budgeted* cost, as in the current survey, or duration, we may, on the other hand, underestimate the effect of project size on success. As a consequence, the prior results of the relations between project size and success should be interpreted with great care.

IT project benefit management, or benefit realization management, may consist of the following steps (adapted from [35,36]):

- Identification of alternative investments and completion of cost-benefit analysis, for example, through the creation of business cases including both quantifiable and non-quantifiable benefits.
- Communication of expected benefits (business objectives of the project) to all stakeholders.
- Plans for the realization of the benefits, with roles and responsibilities.
- Implementation of the benefit realization plan. This should include benefit management activities, such as prioritizing deliveries in accordance with the estimated benefit during project execution, but may also include activities after the project completion.
- Evaluation of the degree of benefits actually achieved.

Several studies suggest that the above benefit management process is connected with an increased likelihood of a project delivering the expected benefits for the client [35,37]. The focus on benefit management in software project processes is, however, quite recent and there is a need for more research into which of the above steps that are essential to achieving project success.

Not only are the provider characteristics essential for project success. Client involvement and competence are also of great importance. The significance of client involvement is illustrated by

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