



# Cost and time project management success factors for information systems development projects

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## Abstract

Successful development of Information Systems (IS) Projects has been a source of competitive advantage for many organizations. This paper proposes the Cost and Time Project Management Success – CTPMS, an essential measure in this context because projects must dynamically address cost and time success under an agreed scope. The goal of the paper is to identify the project management practices through which an organization can optimize the CTPMS of IS development projects. Because multiple factors can influence project management success, we analyze a real-world sample of 899 IS projects of a leading bank, using hierarchical models to account for the effects of predictors at four levels of analysis: portfolio network, project, project manager, and team. In addition to proposing and discussing a new measure of project management success for information systems development projects, we identified that project size, duration, postponement, and project manager formal power showed positive effects, whereas team size and team allocation dispersion presented negative effects. The results suggest guidance for factors such as team member allocation and prioritization, among others.

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## 1. Introduction

Because some economic sectors are very dependent upon the proper use of information, they have attempted to grow their awareness of how to address technology. Organizations have found that developing Information Systems (IS) is the key to success in such sectors. However, even with the required specialization to develop information systems, this activity is not free of failure. In fact, according to a report based on the insights of 3234 project management professionals, 200 senior executives, and 510 PMO directors from many industries, 19% of all projects fail, and not <52% of the total have shown budget loss or scope creep (PMI, 2017).

Despite the fundamental importance of achieving project success, concerning how project management success is considered and measured, the literature does not address the interrelatedness of key related factors. For example, although many studies have shown that project success depends upon project manager characteristics, team motivation, project features and even portfolio prioritization (PMI, 2017), the literature as a whole has not explored the interrelationships of these many levels.

One possible reason for studies simultaneously omitting consideration of these multiple levels of the antecedents of project success is that studies are usually supported by survey data that are collected only at the project manager level. Although these perceptual data can help the researcher to focus on specific factors of project success, they rarely can be collected simultaneously for multiple projects, project managers or teams.

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The purpose of this paper is to analyze the antecedents of information systems development Cost and Time Project Management Success – CTPMS, considering the simultaneity of the variables at multiple levels of analysis: portfolio network, project, program manager, and team level. The goal is to identify the project management practices through which an organization can enhance its competence to achieve the success of information system development projects. This study also adds to the field by employing secondary data and thus avoiding the potential pitfalls of deriving conclusions from perceptual data.

The research used data from a leading financial service provider that develops >3000 IS projects annually. The Financial Service Industry (FSI) is responsible for 13% (US\$ 351 billion) of the world's total investments in IT. In Brazil, the country from which we collected the data, this percentage is even larger because the FSI is responsible for 14% (US\$ 6 billion) of the country's total investments in IT (Deloitte, 2017). Technology is considered a major component for the performance of this industry, demanding significant attention from the agencies that regulate the FSI. For example, the Brazilian Central Bank requires the adoption of specific project management practices to ensure successful risk mitigation and realization of the benefits of IT projects (ISACA, 2013; Terlizzi et al., 2017).

The remainder of this paper is organized as follows. The paper first describes the related literature in Section 2. It then explains the methods in Section 3. Results are presented in Section 4, followed by discussion in Section 5. Finally, we conclude our findings in Section 6 with the theoretical contributions, practical implications, and limitations.

## 2. Literature review

IS project execution entails delivering or improving products and services that contribute to the realization of an organization's strategic goals. Therefore, achieving project success is of the utmost importance and frequently justifies the huge organizational investment.

Because attaining project success depends upon many factors, the success of a project can be evaluated using different forms; no single best method of measurement exists (Thomas and Fernández, 2008). Indeed, this topic has generated extensive discussion since the 1970s due to its various dimensions and interpretations (Ika, 2009). In this context, an analysis of the prior literature is necessary to clarify some differences between project success (PS) and project management success (PMS) and to clarify the different factors and perspectives that can contribute to IS PMS.

### 2.1. Project success and project management success

At least one consensus exists in the literature about PS, that is, overall success should be treated as about two different perspectives. On the one hand, PMS is considered the responsibility of the project manager and means delivering the outputs of the project on time, within the budget and with the required features and functions. Consequently, it is usually measured based on the iron triangle (time, budget and scope/quality). On the other

hand, PS can be viewed as the responsibility of the project owner anticipating the benefits of the project (e.g., financial, quality, flexibility, and innovation) (Badewi, 2016; Chih and Zwikael, 2015; Cooper and Edgett, 1997; Doherty et al., 2012; Terlizzi et al., 2016; Tesch et al., 2009; Turner and Müller, 2005).

Interestingly, from the perspective of the IS projects literature, the concept of PS is massively employed as synonymous to PMS because the iron triangle is used in approximately two-thirds of the 26 publications addressing PS analyzed from 1997 to 2009 (De Bakker et al., 2010). Likewise, The Standish Group has also been monitoring IT project success worldwide since 1994 using the iron triangle as an indication of success; only in 2015 was this concept enhanced to consider other, additional dimensions of success (Hastie and Wojewoda, 2015).

To clarify how the current literature addresses this problem, we performed a systematic literature review of the top two project management journals from 2006 to 2016, seeking to complement De Bakker et al.'s study. This review identified 31 papers, with their main findings presented in Table 1.

First, in the area of information systems development, the most common consideration about project success is scope success (Agarwal and Rathod, 2006). In this type of project, many small changes are expected to be decided upon during the execution of the project. These decisions occur because the owner is not usually completely aware of the specific aspects involved in the system coding. Additionally, occasionally fulfilling the exact definition of a product by codification can result in a large number of hours of additional coding. Therefore, the information systems project manager is frequently compelled to negotiate small changes in scope between the project owner and the project team. This negotiation frequently addresses the unnecessary development time overrun needed to include a less important feature that might be too difficult to implement. Another situation occurs when, in contrast, negotiation is required to approve additional features that might become salient as the development teams develop new ideas that arise during the codification process as they achieve a better understanding of the client's needs.

The need to constantly negotiate small scope changes has even generated an IT phenomenon in the PM practices field, the agile approach for projects (Serrador and Pinto, 2015). This approach can be viewed as a procedure to improve communications and facilitate these small adjustments of scope, time and cost (Mastrogiacomo et al., 2014).

Despite these dynamics, PMS assessment has remained almost the same since the introduction of the iron triangle (Lech, 2013), that is, as though its components of scope, time and cost were independent. When addressing information systems projects, it would be of great value if new measures of PMS were proposed to better combine cost and time, given a scope agreement (Lech, 2013).

Another aspect is that, although project success appears to depend upon multiple interrelated aspects, only a few studies applied the multilevel approach to analyzing the antecedents of success in projects. Twenty papers, or 65% of the papers selected, analyzed only one antecedent level. We found that a substantive number of studies (14 articles – 45%) addressed the project manager antecedent, followed by project perspective

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