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Software development project success and failure from the supplier's perspective: A systematic literature review

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Abstract

In this paper, we consider software development project success and failure from the supplier's perspective. First we clarified concepts in order to be able to exclude review articles on in-house projects, continuous services, the customer's perspective, and software product development, with the aim of providing valid results for supplier firms. We divided success criteria into project success and project management (PM) success, and, in seven articles, identified three success criteria from the supplier's perspective: customer satisfaction, short-term business benefits, and long-term business benefits. In contrast, no definition of software development project failure was found. Articles were found in seven different journals, showing that knowledge on software development project success from the supplier's perspective is fragmented. This impedes the growth of knowledge on this topic.
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1. Introduction

Why do software development projects fail? This question has long exercised the minds of both researchers and practitioners. Although software has been successfully applied in a large variety of areas, software development projects have a reputation for failure. Moreover, researchers have questioned whether we have learned enough to ensure that our software development projects are successful (Cerpa and Verner, 2009).

Before any software development project can be determined to have succeeded or failed, the criteria used in assessment should be agreed upon. In order to support software development the ISO (International Organization for Standardization) and the IEC (International Electrotechnical Commission) have

jointly developed various standards, in one of which a project is defined as "*an endeavour with defined start and finish dates undertaken to create a product or service in accordance with specified resources and requirements*" (ISO/IEC, 12207, 2008, p. 5). Based on the standards and tradition in the software development field, the most common combination of criteria used to measure the success of a project concerns meeting time, cost, functionality and quality goals (e.g. Anda et al., 2009; Atkinson, 1999; El Emam and Koru, 2008; Kappelman et al., 2006; Lai, 1997; Sumner et al., 2006; Yeo, 2002).

However, de Bakker et al. (2010) question these criteria. They argue that, based on their literature review, using the traditional project success criteria, i.e. time, budget, and requirements, easily leads to the conclusion that a software development project has failed. They report that the publications investigated for their paper indicate that during the course of a software development project, the requirements originally defined will almost certainly change, and this will influence the schedule and the costs. Therefore, it is almost impossible to provide adequate time and budget estimates at the beginning of a software development project. Because the traditional project

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success criteria appear to be widely used in these publications, they suggest a definition with additional aspects that define project success (e.g. Shenhar et al., 2001) as well as take into account the individual stakeholder's opinion of project success (e.g. Agarwal and Rathod, 2006; Procaccino and Verner, 2006).

The same problem in software development projects was also discussed by Glass (2001) almost one decade earlier, when he collected a list of frequently forgotten fundamental facts about software development. According to him, most software estimates are performed at the beginning of the software development process before the problem is understood, and furthermore, they are not made by the people who will develop the software or by their managers but by either upper management or marketing. These estimates are rarely adjusted later, and therefore estimates are made at the wrong time by the wrong people and are quite flawed. As a result, he argues that there is little reason to be concerned when software projects do not meet cost or schedule targets.

The literature review carried out by de Bakker et al. (2010) covers the period from 1997 to 2009. When we reviewed recently published articles included in their review, we did not see a transition from use of the traditional success criteria to the use of new success criteria. Therefore, research on software development project success seems to adhere to the traditional project success criteria, and unfortunately this seems to support the claim that software development projects fail, although successful software implementation is globally pervasive.

We note that general project management research has moved further than software development research in examining project success. In this field we find the use of the concepts *project success* and *project management success* (PM success). Two recently published reviews on project success, one by Jugdev and Müller (2005) and another by Ika (2009), emphasize the complexity of the concept, but also highlight the distinction between project success and PM success. Moreover, Papke-Shields et al. (2010) take this distinction into account when defining measures for their study on assessing the use of project management practices. They also note the link between the use of project management practices and project success. Other studies differentiating project success from PM success include Baccarini (1999), Cooke-Davies (2002), de Wit (1988), Dvir et al. (1998, 2003), Lipovetsky et al. (1997), Munns and Bjeirmi (1996), Sadeh et al. (2000), and Shenhar et al. (1997). The same distinction is made by Pinto and Prescott (1990), and Pinto and Mantel (1990), who have used the concepts efficiency of the project implementation process and external efficiency. The first concept refers to PM success whereas external efficiency consists of the perceived value of the project and client satisfaction.

The definitions presented by Munns and Bjeirmi (1996) for project and project management clarify the distinction between these concepts. They define a project as "*achievement of a specific objective, which involves a series of activities and tasks which consume resources*" (Munns and Bjeirmi, 1996, p. 81). This highlights the importance of understanding and attaining the project goals, and a project is a means to achieving those goals. Project management is defined as "*the process of controlling the achievement of the project objectives by*

applying a collection of tools and techniques" (Munns and Bjeirmi, 1996, p. 81). Thus PM success is considered to be measurable (e.g. time/cost/quality) while project success goes further, focusing on longer-term and customer-oriented results (Papke-Shields et al., 2010). For this reason, Ika (2009) advises against confusing project management objectives (time/cost/ quality) with project success.

It has been said that "*a project can be a success despite poor project management performance and vice versa*" (de Wit, 1988, p. 165), and one example of this is the Sydney Opera House. Although it took 15 years to build and the budget was overrun 14 times, it is now generally agreed to be an engineering masterpiece (Jugdev and Müller, 2005). However, it should be realized that whereas PM success may lead to project success, the opposite is not necessarily true (Ika, 2009), as was pointed out also by de Wit: "*Good project management can contribute towards project success but is unlikely to be able to prevent failure*" (de Wit, 1988, p. 165). The distinction between project success and PM success can also be expressed thus: "*the operation was a success, but the patient died*" (Jugdev and Müller, 2005, p. 22). Therefore, PM success and project success should be evaluated as separate but interlinked measures.

This paper focuses particularly on project success and PM success within software outsourcing. When software development is outsourced to an external supplier, there are two parties involved, so the distinction between both perspectives becomes important. We might assume that PM success may be the same for both parties but the thesis of this paper is that project success means different things to the customer and the supplier. Although de Wit noted over 20 years ago that the aim of the customer is to minimize the costs of the project whereas the aim of the supplier is to maximize the profit (de Wit, 1988), a clear distinction between these different perspectives is not commonly made when discussing software development project success or failure (e.g. El Emam and Koru, 2008; Procaccino et al., 2005; Whittaker, 1999). Only recently have studies appeared which note that the customer and the supplier may have different perceptions of risk, risk management, and project success (Jun et al., 2010; Taylor, 2007). Moreover, while the outsourcing literature has extensively discussed subjects related to software development acquisition from the customer's perspective (see e.g. the survey and analysis by Dibbern et al. (2004) and the historical review by Hätönen and Eriksson of outsourcing generally (2009)), little attention has been paid to research from the supplier's perspective (Dibbern et al., 2004; Goles and Chin, 2005; Levina and Ross, 2003; Taylor, 2007). As a consequence, the software development community has, to date, gained little knowledge of outsourced software development projects and their success from the supplier's perspective.

One project that is difficult to categorize as a success or a failure has been recently described by Ahonen and Savolainen (2010) in a study analyzing five canceled software development projects. In one of the cases the supplier finished the software development project practically on time. However, the customer was not satisfied with the new system and never used it, but still paid the invoice. Hence, from the customer's perspective the project was