



Toward successful project management in global software development

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Abstract

Project management in the context of global software development (GSD) is challenging due to a number of issues. This paper has a two-fold objective: (1) to identify the factors from the literature related to the successful project management in GSD and to validate the identified factors in the real-world practice; (2) to map the identified factors to 10 project management knowledge areas of PMBOK. Our results show a positive correlation between the ranks obtained from the literature and the survey. The results of *t*-test (i.e., $t = 1.979$, $p = 0.061 > 0.05$) show that there is no significant difference between the findings of the literature and survey. Our mapping shows that most of the success factors are related to human resource knowledge area. It is anticipated that the identified success factors can be helpful to practitioners for developing strategic implementation of project management activities in GSD environment.

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1. Introduction

Low-cost software development has always been the priority of many organizations. If this low-cost development comes with the added advantage of a high-quality product, then it further increases the long-term benefits enjoyed by the organization (Khan et al., 2009). The search for high-quality and low-cost development has led many organizations to use the global software development (GSD) model (Bush et al., 2008; Khan et al., 2011a; Schneidera et al., 2013). GSD is the process whereby a company either has its software developed by geographically distributed teams or contracts all or parts of its software development activities in return for remuneration

(Ali-Babar et al., 2007). The majority of companies have adopted GSD to gain several perceived benefits, such as reduced development time, access to skilled human resources at relatively low cost and increased product quality (Ali-Babar et al., 2007; Bush et al., 2008; Khan et al., 2011a). Furthermore, GSD has the potential to shorten the project lifecycle using different time zones to organize a 24/7 development model.

However, the cultural differences associated with geographically distributed teams and different time zones have caused problems for GSD-based projects (Jain and Suman, 2015; Kandjani et al., 2015; McLaughlin, 2003). The following key GSD challenges are faced by such projects: lack of client involvement, lack of knowledge transfer, hidden costs, lack of trust among the outsourcing companies, lack of coordination mechanisms and communication issues (Daim et al., 2012; Damian et al., 2007; Khan et al., 2012, 2011b; McLaughlin, 2003; Miyamoto, 2015; Nidhraa et al., 2013; Parka et al., 2012; Yang et al., 2015). A major challenge is that many organizations endorse global contracts prior to testing their project management

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readiness for a global development activity (Khan et al., 2010b, 2011b). Despite the importance of this issue, little research has been conducted toward improving an organization's project management readiness for GSD. We believe a better understanding of the factors associated with successful GSD project management can assist in improving organizations' project management readiness for GSD projects.

This paper has a two-fold objective: (1) to identify the factors, via a Systematic Literature Review (SLR), related to the successful project management in GSD and to validate the identified factors in the real-world practice; (2) to map the identified factors to 10 project management knowledge areas of PMBOK. This in-depth review provides GSD researchers and practitioners with a body of knowledge by uncovering multifaceted success factors of managing projects in GSD. In addition, the mapping of success factors to project management knowledge areas will inform practitioners what factors are important in each knowledge area for successful project management in GSD. Moreover, the identified success factors can be helpful to practitioners for developing strategies to guide the strategic implementation of project management activities in GSD environment. This review is a first step toward the development of a comprehensive readiness framework for facilitating factor-based project assessment in the context of GSD. We published the initial results of this topic as a short paper at a conference in (Niazi et al., 2013c). This paper is an extended version in which we present the results from our empirical study on the project management success factors in GSD projects. Moreover, the questionnaire survey findings (real-world practice) are included in this paper. We also compare the success factors identified through the Systematic Literature Review (SLR) and real-world practices. Identifying these factors will facilitate the successful completion of GSD projects and lasting relationships between geographically distributed organizations. To this end, we intend to address the following research questions:

Phase 1 objective:

The objective of this phase is to identify project management success factors in GSD organizations from the literature.

RQ1: What success factors are essential for project management success in GSD organizations as identified in the literature?

RQ1.1: What success factors, as identified in the literature, are specifically related to client or vendor organizations?

Phase 2 objective:

The objective of this phase is to validate the findings of phase 1, i.e., SLR.

RQ2: What success factors are essential for project management success in GSD organizations as identified in real-world practice?

RQ2.1: What success factors, as identified from real-world practice, are specifically related to client or vendor organizations?

Phase 3 objective:

In this phase, we are interested in examining whether there are any differences between the results of phase 1 and phase 2.

RQ3. What are the differences between the success factors identified through the literature and real-world practice?

Phase 4 objective:

The objective of this phase is to map the identified success factors to 10 project management knowledge areas of PMBOK.

RQ4. What success factors are specifically related to the 10 project management knowledge areas of PMBOK?

Phase 5 objective:

In this phase, the best practices that can be used to successfully implement project management success factors are identified.

RQ5. What are the best practices for the implementation of project management success factors?

The remainder of this paper is organized as follows: [Section 2](#) describes the motivation. In [Section 3](#), we give an outline of our research methodology. [Section 4](#) describes the research results. [Section 5](#) compares the results of the SLR and the questionnaire survey. In [Section 6](#), we provide the limitations of this study. [Section 7](#) provides conclusions and discusses how the findings from this study can be further used in future research endeavors.

2. Motivation

Client organizations benefit from offshore outsourcing because vendors in developing countries (offshore vendors) typically cost one-third less than onshore vendors and even less when compared with in-house operations (Khan et al., 2010a; Tariq and Khan, 2012). Among the many other reasons for outsourcing, client organizations usually outsource their software development work to offshore locations to reduce development costs and to access highly skilled human resources (Chen et al., 2005; Pokharel, 2011). However, a multitude of risks are involved, such as temporal incompatibility, coordination problems, cultural differences and hidden costs (Chen et al., 2013; Khan et al., 2011b; Piri et al., 2009; Tariq and Khan, 2012; Yang et al., 2015). There are many reasons and solutions for these problems (Khan et al., 2009, 2011b; Laplante et al., 2004; Schneidera et al., 2013). One of the major issues facing organizations is that many clients endorse global contracts with their vendors prior to testing their project management readiness for a global activity (Carmel and Abbott, 2006; Khan and Niazi, 2012). For example, a recent Systematic Literature Review concluded that the Global Software Engineering field is still nascent, and comparatively few empirical studies that can help resolve the problems in this domain have been conducted (Smite et al., 2010). Understanding the issues related to an organization's global project management readiness will help ensure the successful outcome of projects and to maintain long-lasting relationships between clients and vendors in different geographical locations (Minevich and Richter, 2005; Niazi et al., 2013a).

The issues that are fundamental to the success of GSD can be broadly categorized as the 3 Cs — cultural, coordinative and

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