

MANAGING OFFSHORE SOFTWARE PROJECTS

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ABSTRACT

Software development is one category of offshored business processes popular in the United States and around the world. The offshoring of information technology services continues to grow at double digit figures, despite an estimated fifty percent failure rate. This study investigates and categorizes various aspects of successful software offshoring projects through an extensive literature review. PMBOK framework is used to analyze these factors and managerial implications are discussed.

INTRODUCTION

Software development is one category of offshored business process popular in the United States and around the world. The key reasons for going offshore in the late 1990s and into 2000 were cost savings and the short supply of skilled IT workers in the United States at that time. The cost savings and use of offshore resources lower inflation, increase productivity, and lower interest rates. This boosts business and consumer spending and increases economic activity. The cost savings in 2003 reached \$6.7 billion. This represents an assumed 40% savings versus what would have been spent if domestic resources had been used instead of offshore resources. (Global Insight, 2004) While global IT software and service outsourcing displaces some IT workers, total employment in the United States increases as the benefits ripple through the economy. Offshoring information technology services continue to grow with double digit figures, despite an estimated fifty percent failure rate (McCue, 2005; Eppinger and Chitkara, 2006). Multiple studies have shown that IT projects fail at an astonishing rate. Cutter Consortium studied onshore and offshore software project failures at more than 200 organizations, evaluating 232 specific software projects (Bennatan and El Emam, 2005). They found that 27% failed to satisfy customer requirements, 50% ran over budget, 58% ran over time, 28% suffered poor quality, and 32% had low staff productivity and moral. The failed efforts consume tremendous resources over months or even years. These failures take a toll that is not only financial but also psychological. Failures demoralize employees who have labored diligently to complete their share of the work.

Table 1. Successful Software Project Indicators

Success Item	Rank
Requirements were met by completed system	1
Final system worked as intended	2
Project was delivered when needed by customer/users	3
Final system consisted of solid, thoroughly tested code	4
Users found final system easy to use	5
Project completed at cost affordable to customer	6
Project completed on time	7
Project completed (i.e., not cancelled)	8

(Source: Procaccino and Verner, 2006)

Every project is constrained in different ways by its scope, time, cost, and quality goals. These limitations are referred to in project management as the quadruple constraint. To create a successful project, the company must balance these four often competing goals (Schwalbe, 2010). Studies into what project managers and contributors consider success in software project supply mixed results. Procaccino & Verner (2006) ranked the software project success indicators shown in Table 1. Note that Scope and Quality dimensions are ranked higher than Time and Cost dimensions.

FACTORS AFFECTING OFFSHORE SOFTWARE PROJECT SUCCESS

Extant literature has identified many factors that affect the success of offshoring projects. This study conducted extensive literature review on these factors and classify them into three categories--project related, outsourcer related, and offshored partner related, similar to the schemes used by Rajkumar and Mani (2001) and Carmel (2003).

Project Related Factors

Project factors play an important (and some say, the most critical) role in determining success and failure. The establishment of reasonable and achievable goals (such as setting reasonable delivery dates and the setting realistic cost estimates) can contribute to project success (Wang, 2007; Sakthivel, 2007). Some believe that the use of performance based incentives (both onshore and offshore) can contribute to success (Amoribieta et al, 2001). The type of development process used (Agile/SCRUM vs. traditional waterfall) tends to play a significant role (with traditional development garnering significantly more success than the communication intensive agile methodology) (Sakthivel, 2007). In addition to the development methodology, the rate of specification and design change as well as the presence of still-evolving requirements is a significant factor in project failures (Carmel, 2003). The type of knowledge required to carry out a software development project plays a part as well – firm specific knowledge or culturally specific knowledge places offshore teams at a disadvantage (Carmel 2003; Nelson, Richmond and Seidman, 1996). The type of skills required to perform project tasks, be they specialized, “bleeding edge” skills or common tasks requiring more skill than talent (Wang, 2002; Slaughter and Ang, 1996). Task interdependence affects the communications requirements. Independent tasks can be accomplished more successfully and with less communication than interdependent tasks (Sakthivel, 2007; Wallace, Keil and Rai, 2004).

Outsourcer Related Factors

Some factors are specific to the offshoring companies. Change management mechanisms and adaptability to change affect success rates (Wang, 2002). Whether the offshoring company is a technology company (Slaughter and Ang, 1996) and whether software development is a core competency (Sakthivel, 2007) affect project outcome. The importance of the project and its bearing on the offshorer’s core competency (King, 2004) as well as the prevailing corporate culture (Wang, 2002; Wallace, Keil and RAI, 2004) play a part. Internal company resources and whether the company can perform the project internally (King, 2004; Amoribieta et al, 2001; Wallace, Keil and Rai, 2004) are also significant.

Offshore Partner Related Factors

The type of company used for offshore projects and available management and governance resources affect project outcome (Carmel, 2003; Wang, 2002). The offshore company business domain knowledge and willingness to spend resources on learning customer specific idiosyncratic and differentiated processes contributes to project success (Wang, 2002; Sakthivel, 2007; King, 2004). Certification and the quality of tools and processes play an important part (Carmel, 2003; Amoribieta et al, 2001, Sakthivel, 2007; Wallace, Keil and Rai, 2004). Company reputation, as well as being clustered with other technology companies (affecting personnel movement and turnover) (Carmel, 2003). A company's turnover rate and staff opportunistic behavior (Wang, 2002) have a negative effect on projects. The use of captive outsourcing (Kumar, Aquino and Anderson, 2007) and bundling multiple offshore projects (Amoribieta et al, 2001) affirm long-term commitment and have a positive effect on project success. Another factor that must be considered is relative productivity (Sakthivel, 2007) as during the first phases of offshored projects, offshore productivity tends to be significantly lower than that of comparable onshore team members.

MAPPING PROJECT SUCCESS FACTORS TO PMBOK FRAMEWORK

Although there are extant studies on offshore software projects, none of them use a project management methodology to review the factors that affect the success of the project. This study uses an internationally recognized standard to investigate these factors and provides. The Project Management Institute (PMI) created the Guide to the Project Management Body of Knowledge (The PMBOK Guide) as a framework and starting point for understanding project management. The PMBOK Guide was first published by the PMI as a white paper in 1987 in an attempt to document and standardize generally accepted project management information and practices (Wikipedia). The project management professional (PMP) certificate by PMI is one of the most popular certifications throughout the world, with 318,289 active PMPs in 2008 (Schwalbe, 2010, p. 30).

Project management is an integrative endeavor; decision and actions taken in one knowledge area at a certain time usually affect other knowledge areas. PMBOK recognizes five basic process groups and nine knowledge areas typical of almost all projects. The five process groups are Initiating, planning, executing, monitoring and controlling, and closing. Process groups overlap and interact throughout project phases, as shown in Figure 1.

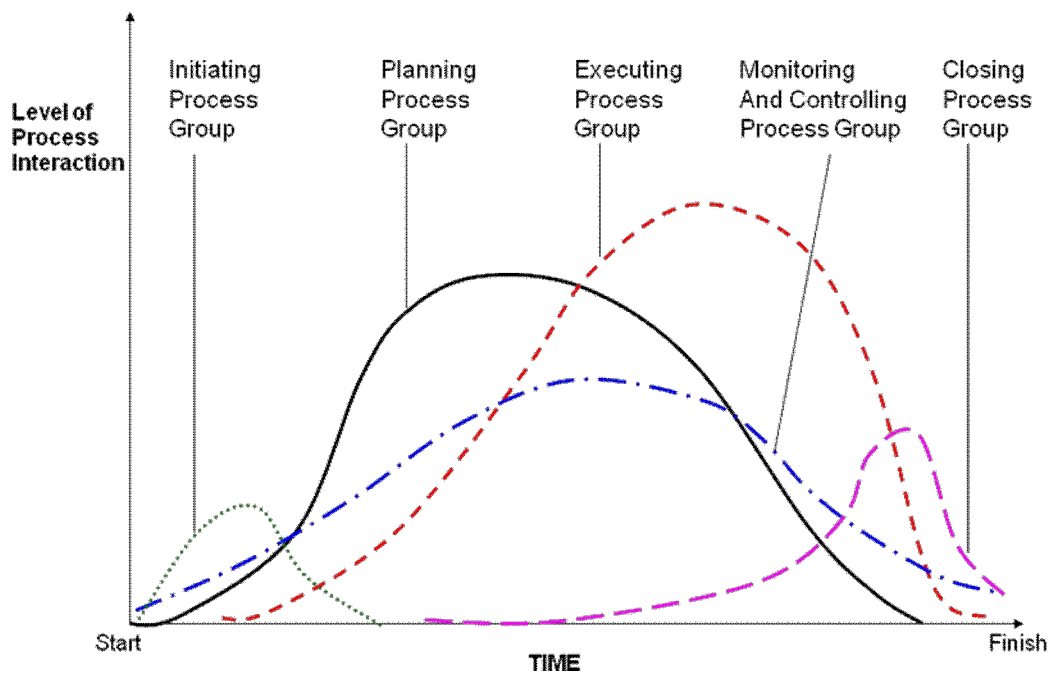


Figure 1: Five process groups interact in project life cycle (Source: PMBOK, 2004)

The nine project management knowledge areas are project integration management, project scope management, project time management, project cost management, project quality management, project human resources management, project communications management, project risk management, and project procurement management.

Among them, project integration management affects and is affected by all of the other knowledge areas. Four core knowledge areas lead to specific project objectives. Project scope management involves defining and managing all the work required to complete the project successfully. Project time management includes estimating how long it will take to complete the work, developing an acceptable project schedule, and ensuring timely completion of the project. Project cost management consists of preparing and managing the budget for the project. Project quality management ensures that the project will satisfy the stated or implied needs for which it was undertaken.

Four facilitating knowledge areas are the means through which the project objectives are achieved. Project human resource management is concerned with making effective use of the people involved with the project. Project communications management involves generating, collecting, disseminating, and storing project information. Project risk management includes identifying, analyzing, and responding to risks related to the project. Project procurement management involves acquiring or procuring goods and services for a project from outside the performing organization.

Table 2: Counts of Mapped Project Factors to PMBOK Framework

Knowledge Areas	Project Management Process Groups					Total
	Initiating	Planning	Executing	Monitoring & Controlling	Closing	
Integration Management	1	4	1	3		9
Scope Management		7				7
Time Management		1	1			2

Cost Management		2				2
Quality Management		1	3			4
Human Resource Management		1	11			12
Communication Management		2	4	1		7
Risk Management		1	1	3		5
Procurement Management						
Total	1	19	21	7		48

Using the PMBOK framework this study classifies all factors affecting offshored software projects from literature review. Table 1 shows a summary of factors affecting software projects and the mapped relevant PMBOK process groups and knowledge areas. Table 2 summarizes the counts of the results. This study shows that factors associated with the planning and executing processes account for 39.58% and 43.75% of all factors, respectively. Typically project management team spends 1% of time on Initiating, 11% on planning, 82% on executing, 4% on controlling, and 2% on closing (Crowe, 2006). Crowe (2006) also finds that the best project managers spend 2% of time on initiating, 21% on planning, 69% of executing, 5% on controlling, and 3% on closing. Extant research suggests that more time shall be spent on planning for offshored software development projects.

Table 2 also shows that the main knowledge areas associated with offshore software project success are project human resource management, project integration management, project scope management, and project communication management. Therefore software project managers and team members shall develop skills and adopt managerial tools in these knowledge areas. Some best practices in project integration management include using project selection methods, creating change control mechanism, and conducting stakeholder analyses. For project human resource management, company shall work on project organization structure, resource leveling plan, responsibility matrix, and team building exercises. To improve communication in a project, company shall develop plan to resolve conflicts, establish push and pull communication channels, and create report templates.

SUMMARY

An extensive literature review is conducted to find factors affecting the success of an offshore software development project. Although there are extant studies on offshore software projects, none of them use a project management methodology to review the factors that affect the success of the project. This study uses an internationally recognized standard PPMBOK to investigate these factors and discuss the managerial implications. Manager can apply best practices and methods to help companies develop skills and plans to ensure a successful offshore software project.

A full set of references available upon request from the first author.