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Factors Influencing Team Performance in Software Development Projects

By:

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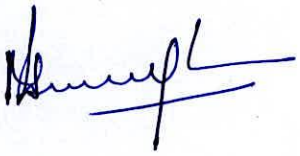
DECLARATION

I declare that the work described in this research was carried out by me under the supervision of Dr. (Mrs.) S. M. Samarasinghe and a report on this has not been submitted in whole or in part to any university or any other institution for another Degree/ Diploma.

Signature:

Date: 31st January 2016

I certify that the above statement made by the candidate is true and that this research is suitable for submission to the University for the purpose of evaluation

Signature:  Date: 31st January 2016

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Factors Influencing Team Performance in Software Development Projects

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ABSTRACT

The performance of software development teams is an important topic in the field of IT projects. Previous research done in western countries has found that the factors such as communication, cohesion, mutual support, co-ordination of expertise, trust and value diversity affect performance of team members in software development projects. However, the findings of existing studies cannot be directly applied to the Sri Lankan context due to cultural and behavioural differences of people in Sri Lanka compared to western countries. Thus, the aim of this study is to investigate the factors influencing the team performance in software development projects in Sri Lankan IT companies, as Sri Lanka is one of the emerging countries engaged in software development projects.

The objectives of this study are to identify the factors influencing effective and efficient team performance in software development projects, to find out the relationship between influential factors and team performance, and finally to make appropriate recommendations for IT industry in Sri Lanka to enhance performance of software development teams. This study mainly considered a sample of 184 IT professionals who work in large-scale IT companies in Sri Lanka, and the data was collected through an online questionnaire. Based on the results, the hypotheses were tested in order to identify the effect of each influencing factor on the performance of software project teams.

It was found that communication, cohesion, trust, value diversity and co-ordination of expertise have significant positive relationships with team performance. However, mutual support was not found to be having any significant effect on team performance.

The findings of this study are useful for managers, team leads and project managers to enhance the performance of software development teams.

Keywords: Team performance, Influencing factors, Software development projects, IT professionals

Chapter 1: Introduction

1.1 Background of the Study

Information Technology (IT) industry drives productivity and innovation in almost every economic sector, helping businesses of all sizes perform better. Today, IT industry is one of the fastest growing industries. It helps both developed and developing countries to design and develop new products and access new markets as well as partners and investors. It is a field with vast potential as the applications of IT in the service of business are limitless (Fonseka2011).

Sri Lanka is an emerging global IT destination, where the Information Technology (IT) industry is one of the fastest growing IT markets in the region. In the year 2007, Sri Lanka was ranked among the Top 50 Global Outsourcing destinations by AT Kearney (Marambe & Jayasundara 2014; Fonseka 2011) and in 2013, Coface, a worldwide leader in credit insurance, rates Sri Lanka amongst top 5 emerging countries with a sound business environment, a high growth which is accelerating, a resilient and diversified economy with sufficient funding capacity to finance growth (Sri Lanka Association of Software and Services Companies, 2014). Moreover, Sri Lanka was ranked 21st in the Global Services Location Index in the year 2011 (Marambe & Jayasundara 2014). The Sri Lankan IT/BPO export earnings had a stable upward trend during the past few years and reported export revenue of USD 255 Million in 2011 with an annual growth rate of 20% (Marambe & Jayasundara 2014). Considering the above statistics, it is evident that the IT industry in Sri Lanka plays a major role in the country's economy. Over 60,000 people are being employed in the IT industry in Colombo and the annual growth rate of the workforce is over 20% (Sri Lanka Export Development Board 2014). The private sector is largely engaged in IT software development projects in Sri Lanka, and many foreign investors have started their development centres within the country due to the skilled workforce and the quality of projects and deliverables. According to Sri Lanka IT/BPM Industry 2014 Review report, the number of companies in the IT industry has grown from 170 in 2007 to over 220 in 2013 (Sri Lanka Association of Software and Services Companies 2014).

In the recent years, the IT industry in Sri Lanka has suffered problems related to the project completion rate (Fonseka 2011; Nagasinghe 2011). This is not only a local issue, as even at global level, many IT firms face the issue of completing the projects

successfully. According to the Standish Group study (2009), 32% of IT projects had had low success rate, while 44% surpassed the planned budget and time, and 24% of the projects failed (Weimar 2013). Furthermore, according to a recent study done by PricewaterhouseCoopers by reviewing 10,640 projects from 200 companies in 30 countries, it is reported that only 2.5% of the companies successfully completed 100% of their projects. Hence, completing software development projects successfully have become a challenging task for companies, and software development can be considered as a high-risk enterprise (Liang et al. 2007; Karlsen et al. 2006; Faisal et al. 2006).

A project can be viewed as an "input-output model" (Koelmans 2004, Liang et al. 2007), where the input is transformed into output, under a set of constraints such as time, cost and quality. Many research studies have been conducted in this arena to identify what factors effect on completing a project successfully. Among them, most researchers have cited clear goals and objectives, accuracy of estimates, team performance, leadership, risk management, top management support, control mechanisms etc. Among these various factors, this research mainly focuses on the 'Team Performance' factor and identifying what are the other sub factors that would influence team performance.

Software Development industry accounts for a major portion in the IT sector in Sri Lanka (ICT Export Value Survey, 2010). Hence, this research mainly focuses on team performance in IT projects in the Software Development industry, and the factors that influence or determine high performance within a project team.

Software development is primarily a team effort (Weimar 2013), and 'Teamwork' has been considered as a crucial factor in software development projects (Weimar 2013; Cooper 1993; Gemuenden 1990; Griffin & Hauser 1992). In project management principles, a common mistake that most of the organizations make would be putting their practices before people. Forcing team members to adopt project management practices and procedures may most likely to cause for the project to end up a failure. According to Gallup Behavioural Research, "Behaviour-based Project Management" is the best approach that enables project groups to gain higher levels of emotional commitment (soft factors) and performance among team members that will ultimately increase project team members' performance as well as project performance (Hardy-Vallee 2012).

According to the previous literature, many researchers have cited that the key to project success is the people, basically the project team and the organization (Weimer 2013; Koelmans 2004). Hence, identifying the role of project team members is vital to completing a project successfully.

Many companies implement rigid processes that dictate behaviour and use statistical methods to control the quality of the project by implementing techniques such as Six Sigma, Kaizen etc. Process guides support work practices, while quality control systems assess and improve outcome (Murthy & Sreenivas 2014). In spite of these approaches, the rate of project failure does not seem to be decreasing. That is mainly because current project management tools, techniques, and theories account for the rational components of project management, but they overlook the soft factors that account for a large part of a project's success.

Every software project will inevitably face the issue of team composition (Liang et al. 2007, pp. 637) that will lead to poor team performance. Hence, this research is mainly focusing on analysing how to enhance software development team performance as the project team's behaviour is one of the key factors that drive successful project management.

Based on previous work, two (02) widely used approaches to measure team performance would be: (1) measuring individual performance and (2) measuring team level performance (Liang et al. 2007; Weimar 2013). In this research, the researcher mainly focuses on measuring team level performance only to measure project team performance. According to previous studies in this area, team performance has been measured in terms of efficiency (schedule (target time) and budget), and effectiveness (quality) (Hoegl & Gemuenden 2001; Weimar 2013).

In search of the factors that influence successful team performance, researchers have examined that quality factors within the team members and various personality characteristics of the team members are significantly related to team performance (Liang et al. 2007; Weimer 2013). Factors such as communication, co-ordination, cohesion, balance of member contribution, mutual support, effort, trust, value diversity, knowledge diversity, social diversity (value diversity, knowledge diversity, and social diversity can also be known as 'team diversity'), management support, and heterogeneity were used by various researchers to assess how they influenced team

performance (Bradley & Herbert 1997; Hoegl & Gemuenden 2001, Weimer 2013; Liang et al. 2007; Stewart & Gosain 2006; Jayawandene & Rajapaksha 2012).

The perception of project success can vary across the team members, the team leaders and different stakeholders of that project. For example, if one perceives a project to be a success or failure, it does not imply that another has the same interpretation of success (Weimer 2011, pp.19). However, as explained by many scholars, team performance is one of the success factors of project success, and it is important critical factor as software projects highly require higher team performance. Nevertheless, target time and cost of the project are the common measures that were used to assess team performance (Agarwal & Rathod 2006; Weimer 2011; Fonseka 2011).

According to previous literature, two (02) central aspects of project team success can be observed through efficiency (schedule and budget) and effectiveness (quality) (Hoegl & Gemuenden 2001, Hackman 1987; Weimer 2013; Stewart & Gosain 2006). Hence, this study will be using the variables efficiency and effectiveness to measure the overall performance of team members.

Therefore, this study aims at identifying the factors that influence team performance and assessing the relationship of those factors with team performance. The next section of this Chapter explains the research problem that outlines the purpose of this study, the intended objectives to be achieved at the end, significance of the research and limitations.

1.2 Research Problem

The purpose of this study is to examine the factors within software development teams that will significantly influence their performance and to analyse which factors affect efficiency and effectiveness of software development teams. It is important to study on the factors that will positively influence team performance, as companies spent more money and time on software development projects and, the software development primarily depends on the collective efforts by the development team. Even though the company creates a project schedule and estimations accurately, if the software development teams do not perform well, the company may not only be unable to work within budget and time estimations, but will also fail to meet the specified requirements of a project, and ultimately end up in failure while losing customers. According to a paper published at ISACA Sri Lanka Annual Conference (2008), 70% of the IT projects fail to meet the specified requirements (Fonseka 2011).

Therefore, it is clear that the local IT industry faces problems with regard to project completion. This study attempts to identify the effect of team performance on software development projects, by mainly focusing on the factors that will increase team performance in Sri Lankan software development companies and analysing the factors that will enhance efficiency and effectiveness of project teams in IT project management.

By analysing and studying about team performance, this study focuses on understanding the soft factors in project management, which is lacking in the project management practices in many organizations.

Based on the research problem of this study, the researcher arrived at the following research questions:

1. What are the factors that influence on effective and efficient team performance within software development projects in Sri Lanka?

2. What is the relationship between influential factors and team performance?

In order to answer these research questions, 10 large-scale IT companies located in Sri Lanka have been considered. Selection of large-scale companies were done based on criteria such as (1) number of employees - more than or equal to 100 (SLASSCOM 2013, pp. 24), and (2) annual revenue - more than or equal to USD 100 million.