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Make Your Plan and Stick to It: The Importance of Adherence to Planning and Process Efficiency in the Success Story of a Software Project

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Abstract

Introduction: Software projects are becoming more and more complex, dynamic in the current global scenario and consequently understanding the factors which affect the success of such complex projects become critical. Lot of research work has been done in this area, and high failure rate of software projects was reported. Proper planning and effective development processare the factors considered for this study; this study tries to understand the impact of planning and processon the software project success.

Design/methodology/approach: Project planning and process is measured through 8 items. An e-mail questionnaire was used to gather the data. Questionnaire measured all items on seven point likert scale, and bi-variate regression was applied to find the impact of planning and process on software project success.

Findings: Project planning and process adapted in a software project has impact on the success of the software project. 77.5% of the variation of Software Project Success is explained by planning and process.

Research limitations/implications: The data were collected from 150 respondents; the size of data can be increased for better result. Planning and processare only two factorsconsidered in the paper to understand the software project success; other factors could also be combined to understand it in a better way. It could be studied in other countries as well.

Practical implications: The findings show the impact of planning and process on software project success, which will help project managers in handling the team in a better way, and management in providing improved working situation for the IT workers for good results in the software projects.

Originality/value: Lot of work has been done to understand the factors affecting the success of software projects, but few studies have conducted such study, with special reference to planning and process, that to in Indian context.

Keywords: Software Project Success, Planning and process, IT Professionals.

1. Introduction

Software project management has been providing guideline for software development, but the failure reported regarding software project failure raises concern of researchers and practitioners. In a report given by Tata Consultancy Services (2007) Sixty-two percent of the projects failed to meet their schedules, forty nine percent suffered from budget overruns and thirty three percent file to perform against expectations. IBM survey (2008) reports that only forty percent of projects met schedule, budget and quality goals. Computer Business Review (2009) reports that software project failure hit was highest in last five years, which was also confirmed by the Standish Report (2009). Jim Johnson (2009) of The Standish Group said apparently, only thirty two percent of all projects succeeded, by delivering on time, within budget, with required features and functions. These statistics about the software project failure motivate to uncover what makes a software project successful. According to Drucker(1986) the management guru planning is very important to make any project successful, and until it is translated into hard work, plans are only good intentions.

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There are many studies that underline the importance of planning in a software project (Jones, 2006; Taylor, 2000; Milis and Mercken, 2002; Sauer and Cuthbertson, 2003). According to Wideman (2002) accurate planning of a software project, including proper sequencing and integration of essential elements of development process is very important for project success. A project management is appropriate application and integration of five processes viz. initiation, planning, executing, monitoring & controlling and closing. Planning helps in mapping and documenting the overall organizational strategy to the task detail. It is extremely important to set and define milestones and identify task interdependencies (PMBOK, 2008). It is vital for a project manager todevelop a plan, break it into smaller task, and define the deliverables, with accurate timelines and functional specifications (Zimmer, 1999). It is also important to be able to deliver new software development in a timely fashion without the risk of business delays due to business environment changes and continue in the use of best practices in software development, which is not possible without proper planning. Planning is translated in terms of task and efficiencies of various tasks and process should also be considered while evaluating the success of software projects (Mahaney and Lederer, 2003; Charette, 2005; Sauer and Cuthbertson, 2003)

As per Haughey (2012) PMP (Project Management Professional) proper planning is a key to a successful project. Planning is sometimes rushed through in order to start the work quickly. Insufficient planning is responsible for thirty nine percent failures of software projects, according to him. Organizations gain competitive advantage by using IT based products and services, without proper planning the odds of success in terms of time, cost and functionality are very few. Proper planning of resources, testing, risk management and project deliverables is recommended by Davies (2011), Director Dimension Data.

2. Significance of the Study

These statistics about the software project failure motivate to uncover what makes a software project successful. Understanding the importance of proper planning and efficient process, it becomes very important to measure the impact of planning and process efficiency on the success of the project. Strategic planning and efficient process orientation were also identified as factors affecting the success of the software project by Dyba (2005).

3. Literature Review

Software project management is a blend of technique and art and hence to make it successful more efforts and proper planning is required. As per Boehm & Ross (1989), planning is essential for project success and rather than jumping to development, adequate planning regarding tasks, human resource and risk mitigation is must.

Lebow (1998) conducted a study on understanding the success factors for bar coding project. He emphasized the importance of accurate planning. The requirements of the Information System must be clear and end users must be involved during the early stages of planning. The project planning must be done keeping in mind the time, money and people.

Importance of planning for project success was also identified by McConnell (2001). According to him, effective planning differentiates between successful and unsuccessful software project. It is also crucial to identify badly planned projects for future work, and to do so he specified certain criterion. It's very crucial to identify badly planned projects, as it is learning for future, the criterion for such identification are given by him. A project definitely fails if all the activities in the project are not been taken care properly, no planning is done for risk management, same plan is used for different projects, prepackaged plan is applied indiscriminately, letting the plan diverge from reality, non flexible approach used for dynamic project activities and to plan to make up lost time for delayed projects.

McManus (2003) observed that planning is extremely important, and specifically risk planning, conducting pre-planning meetings with the stakeholders and team, risk planning and management, this planning reduces the cost overhead, and improves quality which is trio of success.

Risk planning was also identified as an important factor for project success by McHaney, White & Heilman (2002). They conducted a study for simulation software, where they tried to analyze data of failed project. The result showed that the project is successful if the software developed is easy to learn, user friendly and is provided with online tutorial.

Software development and information system evaluation are critical for organizations going for automation. In order

to reduce the failure rate, Brown (2005) has emphasized on proper planning for the decision making process. He did extensive literature review and analysis of two cases: expert system (CONFIG) developed to support the sales staff in a computer company, CompuSys given by Markus and Keil (1994) and another outsourcing vignette (Alpha) given by Smithson and Hirscheim (1998). The result highlighted the importance of proper planning to blend the technology and organizational need.

Zwikael & Globerson (2006) conducted a study to establish the relationship between projects success and quality of project planning for this four industries – construction and engineering, software and communications, services, and production and maintenance were considered. The quality of planning was calculated as the weighted average of the frequency in which each of the thirty three planning products was executed, as execution frequency is an indicator of quality of planning.

An empirical analysis focused on estimating the life of software at the feasibility analysis stage was conducted by Richmond, Nelson & Misra (2006). The study used seven hypotheses detailing how scope, approach and technology decisions affect a system's life span.This paper presents an empirical analysis of the life span of over one hundred and eighty systems. The result helped in developing a model for determining the planning horizon for new software at the business case stage of software acquisition.

Planning the project and making all required estimation is also recommended by McBride, Henderson-Sellers & Zowghi (2007). They highlighted that project managers need to understand the novelty of projects before planning the projects. In order to collect data, interviews were conducted with project managers from software development organizations in Sydney, Australia and convenient sampling technique was used.

Most of the CEOs consider investments in IT as strategic imperatives that help to fit the firm to the environment (Kearns & Sabherwal, 2007). At the same time, they express dissatisfaction with many IT project outcomes. A study was conducted by them using questionnaire filled by ten CIOs from five different industries in a major midwestern metropolitan area.

Agile methodology emphasizes the need to keep code simple, test frequently, and delivers in a series of small, working packages or iterations, Bird (2010) emphasized the importance of agile software development methodology. According to himsoftware development methodology was a potentially viable study as it is related to the organizational and individual processes involved in the development of information technology in organizations.

Dezdar & Ainin (2011) conducted a study to identify factors that are crucial for the successfulimplementation of enterprise resource planning (ERP) systems. The study was conducted using a survey questionnairedistributed to ERP users in Iranian organizations. The result showed thatbetter the project management activities are, the more likely theimplementation will be successful. Importance of planning, organizing, including planning for human resource was highlighted.

Lo (2011) identified five project management process groups i.e. initiating process group, planningprocess group, executing process group, monitoring and controlling processgroup, and closing process group as critical factor affecting the success of factor, reinforcing the multidimensional definition of project success.

Planning for risk management is also an integral part of project planning as the dynamic nature of software project; make it more susceptible to risk. Płotka & Syty (2012)conducted a case study on educational IT projects called "e-Experiments in physics" project, in European Union. The study stressed upon the importance of careful planning and risk analysis.

Human centric nature of software processes was indicated by Unterkalmsteiner, Gorschek, Islam, Cheng, Permadi, & Feldt (2012**)** due to which software projects are prone to unexpectedor undesired performance and behaviors and software processes needs to be continuously assessed and improved in order to fulfill the requirements of the customers and stakeholders of the organization. Software process improvement and measurement of the software process is a substantial in the attempt to reach predictable performance and high capability and to ensure that process artifact meet their specified quality requirements. Thesystematic literature review includes one hundred and forty eight papers published between 1991 and 2008.

The literature review highlights the importance of planning and process efficiency for defining the software project success. A study is required to empirically understand the

combined effect of the two on project success. Our study is a step ahead of the previous work in understanding the impact of planning and project efficiency on the project success by applying regression.

4. Hypothesis

- There a significant positive relationship between the success of the software project and Planning.
- There a significant positive relationship between the success of the software project and Process.

4.1. Research Design

The present research is causal in nature, trying to figure out the impact of planning and process of a project on the success of the software project.

Sample design: The research was carried out in the software organization of India. We have taken the sample of IT professionals by dint of stratified random sampling resulting into total sample of 150. Respondents were given the self administered questionnaire over electronic-mail and were required to rate the questions on a seven-point Likert scale. Thirty questionnaires were sent to each IT organization and the final respondent participated in the study by returning the self-administered questionnaire was 150.

4.2. Data Collection

The data were collected from five leading IT firms of the country through a questionnaire where each item was measured in Likert scale.

Planning and process are measured through a composite score of following items:

4.3. Planning

- The planned **budget** was exactly adhered to.
- The planned **day of delivery** was exactly adhered to.
- The planned **functionality** was exactly implemented.
- The planned quality level was exactly met.

4.4. Process

- The development process was more efficient compared to similar projects.
- The software development teamachieved success with their given effort.
- The software development team worked efficiently.
- The software was easy to learn by the customers.

4.5. Statistical Design

Bivariate regression was used to assess the impact of Job satisfaction on software project success, where software project success is the dependent variable and Job satisfaction is the independent variable. Previous researchers have also used regression in their study. Dyba (2005), also conducted a quantitative study by surveying hundred and twenty software organizations, by using questionnaire comprising of thirty six items, which apart from planning also included organizational factors, measured on seven point likertscale. Regression was applied to analyze the data. Basten, Joosten & Mellis (2011) conducted an empirical study to establish the importance of process success and customer satisfaction for software project success. They defined process success as adherence to planning and process efficiency. The data was collected from eighty six projects from information technology and telecommunication organization in Germany. Regression was applied to the data collected through questionnaire; the result showed that process efficiency, functional planning and customer satisfaction explained eighty percent variance.

4.6. Model and Variables Definition

The following model is used for testing hypotheses:

Success of the Project = $\beta_0 + \beta_1$ Planning+ β_2 Process

The variables are explained as following:

Success of the Software Project:

Successful software projects are often defined as meeting business objectives, deliver on time and within budget, and meeting requirements (Nasir & Sahibuddin, 2011).

Table 1.

Descriptive Statistics					
	N	*Minimum*	*Maximum*	*Mean*	*Std. Deviation*
Success of the Project	150	2	7	5.51	1.284
Process	150	2.00	7.00	5.5322	1.10448
Planning	150	2.00	7.00	5.3949	1.16701
Valid N (listwise)	150				

Table 2.

Correlations				
		Success of the Project.	*Process*	*Planning*
Success of the Project	Pearson Correlation	1	.779**	.871**
	Sig. (2-tailed)		.000	.000
	N	150	150	150
Process	Pearson Correlation	.779**	1	.807**
	Sig. (2-tailed)	.000		.000
	N	150	150	150
Planning	Pearson Correlation	.871**	.807**	1
	Sig. (2-tailed)	.000	.000	
	N	150	150	150

** Correlation is significant at the 0.01 level (2-tailed).

4.7. Project Planning

Software project management is the art and science of planning and leading software projects.It is a sub-discipline of project management in which software projects are planned, implemented, monitored and controlled. (Stellman, A. & Greene, J., 2005)

4.8. Project Process

Software process models integrate software engineering methods and techniques and are the basis for managing large-scale software and IT projects. High product quality routinely results from high process quality. (Münch, J., Armbrust, O., Kowalczyk, M. & Soto, M., 2012)

5. Empirical Results

5.1. Descriptive Statistic

Descriptive statistic only portraits variables distribution and does not give information as to the relationships between variables. Research descriptive statistic is shown in Table 1.

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5.2. Correlation Matrix

The correlation between variables indicates that how much of variables changes is explained by other variables which is between 1 and -1. The correlation between variables is shown in Table 2.

The results provided in Table 2 reveal that the correlation coefficient between Software Project Successand Process is 0.779 Software Project Success and Planning is 0 .871and the correlations are significant.

Process is significantly different from zero ($t = 3.297$, $p < .05$) and planning is significantly different from zero ($t = 10.5$, $p < .05$).

Table 4 shows that the model is statistically significant ($F= 253.73$, $p < .05$)

Table 3.

Coefficients[a]						
Model						
		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.020	.261		-.078	.938
	Process	.254	.077	.218	3.297	.001
	Planning	.764	.073	.695	10.503	.000

a. Dependent Variable: The project has been a great success from my point of view.

Table 4.

ANOVA[b]						
Model		*Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
1	Regression	190.353	2	95.176	253.733	.000[a]
	Residual	55.140	147	.375		
	Total	245.493	149			

a. Predictors: (Constant), Planning, Process
b. Dependent Variable: The project has been a great success from my point of view.

Table 5.

Model Summary				
Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error of the Estimate*
1	.881[a]	.775	.772	.612

a. Predictors: (Constant), Planning, Process

Table 5 reveals that a significant regression was achieved with R^2 of 77.5% which shows that the relationship between Software project success and Process & Planning, 77.5% of the variation of Software Project Success is explained by Process & Planning.

Table 3 further reveals the relationship between Job satisfaction and Software Project Success which is as follows:

Software Project Success = -.020 + .254 Process + .764 Planning

Discussion

Software process improvement and measurement of the software process is a substantial in the attempt to reach predictable performance and high capability and to ensure that process artifact meet their specified quality requirements. In order to reduce the failure rate, and for good decision making proper planning is inevitable (Brown (2005). The statistics about the software project failure motivate to uncover what makes a software project successful. According to Peter Drucker (1986) the management guru planning is very important to make any project successful, and until it is translated into hard work, plans are only good intentions.

Limitations

The data were collected from 150 respondents; the size of data can be increased for better result. Planning and process are only two of the factors affecting the software project success; other factors could also be combined to understand it in a better way. The study was conducted in only one country.

Future Work

This study analyzed 150 data for the result, sample size can be bigger. The future study could combine other factors like leadership, team building, risk management, testing etc to understand the reasons of success in a better way.It could be studied in other countries as well

Conclusion

From the results it is clear that both good planning and efficient process leads to a successful software project. No developer/ project manager can escape the software process improvement, which is a systematic approach to increase the efficiency and effectiveness of a software development organization and to enhance software productsthe better the project management activities/ good process the more likely the implementation will be successful. Project management must focus on process efficiency, instead of just good planning. This will definitely bring down the failure rate of software projects.

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