

Analysis of Various Factors in Software Project Management

Anurag Chakraborty, Kamalakannan J, Sonam Sharma, Dhritistab Basak

Abstract—Any software project has to look into various factors that govern the project in order to get successfully completed. Project planning has to play a major role, being an umbrella activity which covers several parts and workflows under it. The planning needs to be administered, managed handled, organized and controlled carefully because a software project may often be subjected to several threats, such as that of deadlines, resources, manpower, risks, customer satisfaction etc. Satisfying a customer is the most important job. Hence, a project often appears to be changing with dynamic behavior and a bit of uncertainties as well as complexities that may creep in. The IT world is growing and springing up fast to a global extent and alongside new trends of technology is coming up as per the client's needs and preference. In order to cope up with such trends and to make them fall into place, software projects need to act accordingly and adapt themselves incorporating newer management practices and ethics. Our aim is to find out the behavior of projects against several crucial factors like threats as well as risks and how those can be handled before hand, eliminating the chance of their occurrence at the first place itself using the concepts of several models like Waterfall, Spiral, Prototype, RAD, RUP, Agile etc and how software projects can adapt themselves, bringing out newer management thoughts, despite having and leaving some of the traditional methodologies.

Keywords— Agile methodology, Activity priority, Expansion of IT world ,Management ethics, Gap analysis, New management trends ,Software project management, Software management practices, Software project models, Software project management challenges Technological advances.

I. INTRODUCTION

A project is defined to be a collection of well-defined classes and operations on those classes which are to be executed to achieve a distinct, unique and particular goal. Every project has a need and is bounded by a scope. The goal can be achieved if all the factors and adequate resources fall into place. Once the goal is achieved, the project is slated to have ended. Here we give an insight of the crucial factors that affect and leave an effect at the same time in software projects and newer trends that have to be incorporated even after being

newbie so as to experiment and put them into place (if successful results are achieved) to improve more in the overall management procedure associated with software projects.

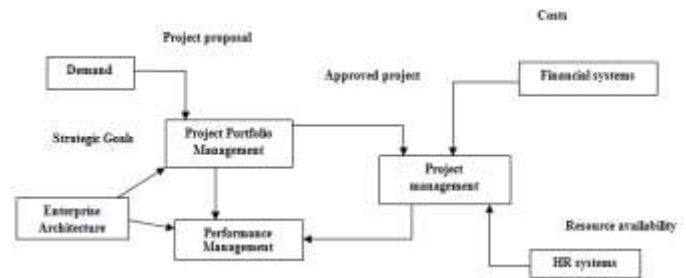


Fig. 1 – demonstrating software project management scenario

II. LITERATURE SURVEY

Mauricio Covalan Rosito and Ricardo Melo Bastos , in their paper, [1], proposed a model named ‘Software Project Integrated Model’ which combines the essence of software project management along with essential organisational workflows. The model was based on ‘Rational Unified Process (RUP)’. The experiments have put forward some results which seemed to help project managers to have a brief outlined project plan rather the old ways of planning. Moreover, the tasks should be properly defined. It clearly states that if a project manager appears to have questions or doubts or thoughts on the project that may seem to arise at a later stage in the project development, it may affect the timeline of the chart, thus resulting in a bit lagging and delay in the project along with a change in behaviour of the project, and most importantly the motivation and dedication of the team members. The ‘SPIM model tries to reduce any kind of problems or complex turn-ups that may come at subsequent stages.

Rehan Akbar, Mohd Fadzil Hassan, Azrai Abdullah, Sohail Safdar, Muhammad Asim Qureshi, in their paper, [2] , states that the client plays a key role in the overall success of the project , in addition to the other major factors which help in building a project. Yet the client factor fails to gain much prominence and come in the spotlight. Business management states that we need to understand how and what a client wants and act accordingly. The paper puts forward the ‘CPMM Model [Collaborative Performance Management Model]’ which says that planning and other activities which fall under it should be done based on the client’s understanding and needs. Though this being an innovative approach in the field of

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project management, a detailed study needs to be done before hand.

Aedah Abd Rahman and Nurdatillah Hasim, in the paper, [4] has tried to point our look into the most important aspect in software projects – the quality, how to maintain the quality and how to produce it at the end without any defect. They have gone through what type of defects occurs, their classification, their nature – repetitive or one-time and what are the good ways to manage them. They have proposed several steps of defect management which when collaborated together form a cycle. The steps include defect identification; if the same defect is occurring repeatedly then to note down their cause and to remove them so that in later cases, they can be automatically put off from the sight at the first instance. Other steps include analysis, prevention, resolution and monitoring.

Rogério Eduardo Garcia, Ronaldo Celso Messias Correia Celso Olivete J'uniór and Analice Costacurta Brandi, in the paper, [5] basically describes how it is possible to achieve deadlines, budgetary goals and most important of them all being, delivering a product that meets customer expectations. They have presented a qualitative analysis from the data they have collected along with the application and using practical activities they also approached to teach and learn software project management. The objective of their work was to provide the experience of how to apply theoretical concepts in practical activities. In this work, they have selected four groups and each one was assumed to have played a different role (viz. a manager; person enrolled in the task of assuring software quality; an analyst, a designer and even a programmer). The principle was the team should be formed across software processes by respective managers. They had used four projects in which each group was given the charge of managing disparate projects.

José Adson O. G. da Cunha, Fabio Q. B. da Silva Hermano P. de Moura and Francisco J. S. Vasconcellos, in the paper , [6] stated that the process of decision-making in software project management is generally based on knowledge sharing in which the SPM acts as a facilitator for making decisions. This phenomenon is again influenced by several individual factors, like experience, communication, negotiation, self-control and systemic and schematic observation of the project and contextual factors such as autonomy of the SPM and team members' technical competence. Also, these factors may be mediated by cognitive biases. The models of decision-making in the naturalistic decision approach (e.g. recognition-primed decisions and the model of cognitive control considering that people use prior experiences to rapidly categorize situations). From this perspective, making a decision means committing oneself to a course of action where plausible alternatives exist, even when the person does not identify or compare these alternatives.

Su Chunli and Wen Rongbin in the paper, [7] proposed that the goals of the software itself can determine the various differences between software project management and other management. Primarily, because software is one of the intellectual products, the development process inherits a particular degree of difficulty. The schedule and quality is

difficult to control, we have to strengthen the management of software project; secondarily, because the software system itself has a certain degree of complexity, this leads to some difficulty to control the risk in the process of development. Software project management affects the work of software development in a certain extent, with the continuous optimization and innovation of software technology; the corresponding enterprises thereby begin to pay more attention to the quality of software engineering rather than management.

Jihkne Krichbne, Nouredine Boudriga and Sihem Guemara El Fatmi in the paper, [9] suggested that previously numerous estimation models have been proposed and used during the late decades. However, to our knowledge, these techniques have considered that security projects are aggregate of sub-projects, which may be addressed separately. Estimation techniques include COCOMO, COCOTS, COQUALMO, and Expert COCOMO. These techniques have addressed the cost estimation of the development of software, constructive integration, and have determined defect introduction and removal, and risk assessment, respectively.

Maria Ester Ferreira and Anabela Pereira Tereso, in the paper, [10] states that nowadays, projects are diverse in nature. They are distributed and works are done at different areas (geographical) or the team members from different sites have been allotted to a particular project. In that case, we have to understand the environment as well as the psychology that comes into being due to the distributed nature that project has or may appear to have. As a result, continuous and collaborative communication packed with management is needed. 'Clarizen' is such a software which helps to manage those projects which appear as distributed or diversified in nature.

III. CHALLENGES

How to make a permanent mark: Developing a project is no big deal unless you stick and sustain a place in the market since now everything is one way or the other globalised and a tough competition arises. Having a prolonged place in the market is very necessary which too has to be given a thought earlier in the planning phase itself whether the software that is going to be built will help the organisations to retain their place in the market . This is not only possible through proper planning but also due to quality. The quality needs to be enhanced. To survive in the market, the organisation has to be constantly innovative and understand the latest customer needs and tastes.

Saas occupying the market place – Saas stands for Software – as – a – Service. Now most of the companies are subscribing or going for implementation and launching of Saas models where the subscription entitles getting a license and hosting the software centrally. This sheds of any kind of accountability and maintainability. Moreover, these are somewhat reliable and to some extent value - for money or in other words, cost – effective.

Return on investment – more or less - Another pivotal factor is the return that is to be incurred in terms of money at the end of the successful development and launching of the software. We need to find whether the overall process will be

profit – giving or not. All revenue and accounts need to be tracked and noted or kept records off through CPA accounting. The AICPA lays a helpful support or amenity to find out or get ideas about revenue recognition

IV. WORK METHODOLOGY

A survey was also conducted among working IT professionals .The questions that were asked were:

1. Which one do you think to be the most crucial part in software project management?
 - a. Planning
 - b. Risk management
 - c. Meeting deadlines or sticking to timeline
 - d. Customer or client satisfaction

2. On a scale of 5, how will you arrange the above activities in order of their importance? (5 to be taken as the highest priority and 1 to be the lowest.)

The main objective of this survey was to find which factor should be given most importance while development of a software project and how the factors go hand-in-hand with each other. We also tried to develop a model based on results obtained from the survey. The model is based on how the factors need to be prioritised while working in the project scenario.

Answers retrieved from both the questions are put forward in the following tables:

TABLE I
SHOWING ANSWERS OR RESPONSES GOT FROM QUESTION 1.

No. of persons surveyed	Planning response	Risk Management response	Time	Client or customer satisfaction response
20	16	1.5	1	2

TABLE II
SHOWING ANSWERS OR RESPONSES GOT FROM QUESTION 2

Factors	Maximum rating received on a scale of 5 (5 highest priority; 1 being the lowest)
Planning	5
Customer/Client satisfaction	4
Risk management	3
Meeting deadlines	1

The table shows the rating received per each factor and based on the rating, how the factors need to be given more priority while managing software projects.

The result or the answers obtained from question -2 (two) with the help of Table-2 can thus be accumulated in the form of the following flowchart:

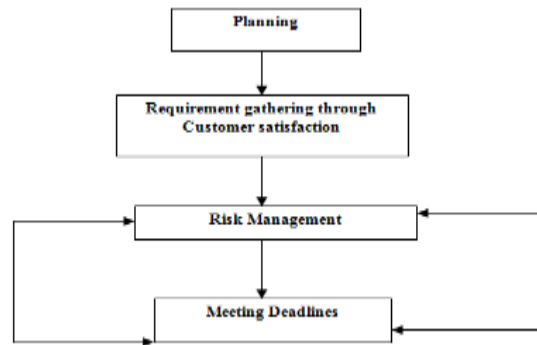


Fig. 2- Flowchart to represent the activities in chronological order of their importance

Based on the flowchart obtained from question- 2 of the survey conducted, we can find the order or the priority in which the activities are to be executed. Customer satisfaction and meeting deadlines are inter-related with one another , while in the later stage we also find that risk management and meeting deadlines also go hand-in-hand because if risks are more, time or deadline will also get extended and vice versa.

V.PROPOSED METHODOLOGY

Client factor: If we tend to give too much importance to the client, and rely upon what the client demands and how he/she wants the final product and leave it entirely upon the decision and discretion of the client at the same time, then there may be chances of discrepancies, because though the client has a view of what he demands or wants, at the end he still lags knowledge about the architecture and work-flows associated with the overall planning and development of the software. So it’s better to have a prototype model which will enable to interact with the client, thereby reducing the time consumption to be incurred in the development and launching phase. We can also communicate with the client at every stage in the development phase but some authority needs to be within the control of the project manager with supreme control and authority, the different team leaders and the developers. We may not forget that client satisfaction is also important.

Restoring performance: A gap analysis needs to be done and conducted after every project completion. Gap analysis puts forward what difference lies between desired and actual outcome. It will enable in fulfilling optimum resources, manpower, time, capital, technology and other crucial factors in later projects. Desired outcome will represent what is needed to be made or as desired or wanted by the client and actual outcome will represent the difference, if any between what was thought of and what has been achieved finally.

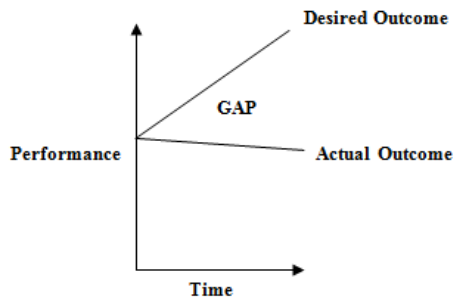


Fig. 3 – Representation of Gap Analysis

Environment, a major concern in today’s world : Nowadays, environmental issues are booming over, and it has become a necessity to protect the environment in whatever we do. Environment is getting associated with the work done in our daily lives and with the advent of green computing and several organisations going gaga over it, giving a thought to the environment during the planning phase in software projects is none the less behind. For a software project to get executed, the basic and minimum, yet most needed resource is a computer. Now when a computer is running, heat is being generated which is getting mixed with the air. If the work is done within the stipulated deadline, then the amount of heat generated is fixed. Once the deadline is not adhered to, the heat generated will be more. So the pollution and time is going hand-in-hand. This furthermore gives rise to the concepts of online waste management.

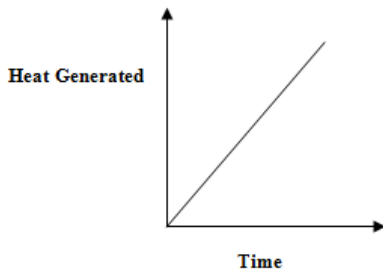


Fig. 4 – Graphical representation of heat getting generated along with time

Agile paving the path for faster development: With new and emerging trends, it is now time to welcome the new and leave behind traditional ones. Such is the case for project management as well as development where it is time to leave behind traditional methodologies and start afresh or develop using agile methodology which is more secure with less chances of risk, faster development adhering to deadlines or even sometimes before the stipulated ones and main factor being customer satisfaction since it gives chance of customer and stakeholder communication almost at every stage. The plus point of it being, it combines or integrates two successive development stages, unlike the ladder or one-after-another one as in case of traditional SDLC models.

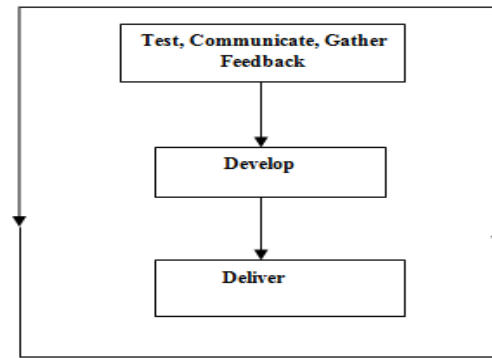


Fig. 4 – Representing a proposed basic model of agile methodology.

We know that psychology is the “study of behaviour”. It plays a vital role in project management scenarios. It helps us to understand the attitude, taste and preferences as demanded by clients. It helps the managers or team leaders as well to understand the capabilities of the team members; it helps them to motivate them so that they can contribute towards the attainment of the project’s goal or objective

VI. RESULTS AND DISCUSSION

It has been found that around 80% have stated that planning is the most challenging and important job for any project from question -1. The results or the answers obtained from the survey and retrieved from TABLE I are thus accumulated in the form of the following bar chart:

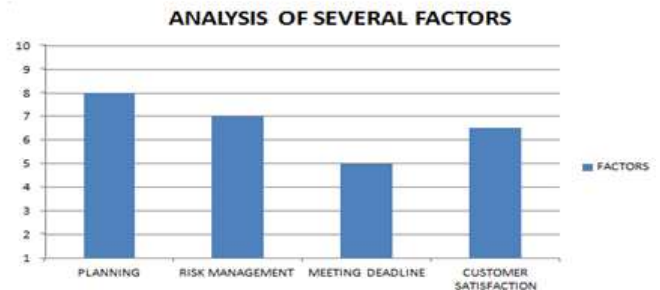


Fig. 5 – Plotting the activities in order of their importance and priority in a software project

We have tried to get an insight of the factors that come into being while management scenarios in software projects are handled. We have gone through the upcoming challenges in projects and also gone through incorporating new management trends, ethics and practices, newer models that can help the project managers and those involved in the team to develop and manage the projects. As the IT world is expanding and newer projects with innovative ideas and client requests are coming up, management practices too need to fall into place alongside anew. Keeping the old methodologies and practices as bases or rough sketches and looking into customer or client’s innovative project demands and tastes, we have tried to figure out some challenges in the IT industry as well. Not only developing, but also thriving in the market, maintaining as well as enhancing the quality with the cost too holding a big

role in the picture, these challenges need to be kept in mind. So on the whole, having the old methodologies and the challenges in hand and keeping an eye on whatever happening in the current IT world, client's newer demands, slight differences of taste and preference, software projects need to adapt themselves in terms of management trends and bring out thought-provoking ideas and methods.

VII. CONCLUSION

With the emerging trends of technology and the IT world too becoming globalized with newer development tools and trends, software project need to adapt themselves to what the customer wants as per their needs and become flexible at the same time. Moreover they need to focus on innovative and current management principles and practices so as to sustain in the software market. It is therefore time to leave apart some traditional methods and focus on ongoing methodologies, ethics, views and practices.

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