

Comparison Between All Major Project Methodologies To Propose A Standard Framework For Indian Construction

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Abstract- *How practical is it to carry out a construction project without a pre-defined methodology? It is quite possible to start and end a project. The only difference is that there won't be any discipline w.r.t time, cost and quality of the project, which is unacceptable. At the same time, there is also a genuine need of crafted methodology for the Indian construction industry. This study aims to propose a standard methodology for the Indian construction, which have been formulated considering the efficiency and optimization of all major methodologies and, bring the comfort to educate and train the employees and workforce. Integrating the management tools such as Last planner system, Kanban, poka yoke, value stream mapping etc into our construction methodology would help to eliminate miscalculations and deviations from what was planned.*

To identify the present industry awareness on the tools and methodology options, a survey were conducted, where the knowledge of around 30+ construction professionals were considered and recorded. This survey helped with the questionnaire for the one-on-one interview with the industry professionals. The results help us understand the way in which we can propose a single methodology, which is a combination of number of work packages divided according to the project phases. These work packages include the tools and techniques, which have been consolidated from various methodologies. This paper briefly talks about how we can achieve a custom-made framework for the Indian construction industry by doing a comparative study of all major project methodologies.

Keywords- Construction Project, Standard methodology for Indian construction Industry, Last planner system, Kanban, poka yoke, value stream mapping

I. INTRODUCTION

Project management methodology is at the heart of what makes a construction project flow. A framework is a

very vital part for the execution of any project and identifying the type of framework or methodology at the beginning is of prime importance. A project could only be successful (w.r.t time, cost, sustainability, safety, customer satisfaction and quality) if it strictly follows a predefined framework. A project methodology involves all the stakeholders from the project and should extend a collaborative platform. Involvement of all the stakeholder form the inception stage till its final handing over stage should be facilitated in a methodology.

An ideal framework would be something which would be evolving constantly with time. So, scope for future improvements and frequent upgrading of the frame becomes very important to cater the increasing and dynamic needs of the construction industry. So, to identify and understand the methodologies, an in-depth study of all the major methodologies along with their tools and techniques needs to be done.

A. Need for the study

It was always a matter of concern, when a project manager or a management decides on the project methodology to choose for the upcoming project. It was often observed that based on experience or expertise the PM or management chose the project methodology, which are none other than the traditional techniques. No doubt these traditional methodologies are well equipped to cater to the project requirements of within time, within cost and with quality. But when it comes to the implementation part, many of the project shows poor implements of the techniques

In present scenario, the objectives further extend to Sustainability, Safety and customer focus which creates a need of methodology which have the tools and techniques to serve these objectives. As the traditional methodology nowhere talks about sustainability or safety or customer focus.

B. objective of the study

In Indian context, no construction project methodology is self-sufficient to cater all project aspects. These methodologies cannot be directly put into execution without altering its actual framework as per Indian scenario and even if implemented directly and turns out to be successful, still it might incur additional cost and time w.r.t its implementation part. The aim of the project is to identify and propose a tailor-made framework for the Indian construction industry which would be a consolidated framework having the best and at the same time easy to understand tools and techniques drawn from various major methodologies used in construction as well as in manufacturing industry.

The output from the framework also focuses to strike a balance between all the 6 major project objectives i.e. cost, time, quality, customer focus, sustainability and safety, as no objectives are of greater or smaller importance with respect to other. These objectives are to be predefined in the conceptual and planning phase itself and no further adjustment or alterations are to be made after starting with its execution.

II. LITERATURE REVIEW

In accordance with the paper published by Remon Fayek on lean, the vital part of lean is leadership commitment which is backed with continues improvement[1]. The lean principles talks about value, value stream, flow, pull and perfection [1]. In the other paper by Giorgio Locatelli, he speaks about Lean Construction and LC mainly focuses on Identification and minimizing waste by providing Built in quality, customer focus, minimization of wait time and by creation of a continuous flow.[2] . He also in his paper talk about increasing workforce productivity, minimizing of rework and better coordination using lean[2]. Eliminating of non value adding activities also increased the value of the project to a greater extend as the real customer requirements could be focused upon[2]. Lean construction also bring by default a provision to deal with the waste in the construction industry is what is explained by Richard in his research paper[3]. This paper also speak about the seven types of mudas and how by using lean practices how these mudas could be taken care of.[3]. The productivity of the construction industry have been reducing over past 40 years and the only way in improving the situation is by bring in lean techniques[4]. Lean construction is implemented through various tools and techniques such as the last planner system. Visual management, daily huddle meeting etc and act as a project successors[4].

In a research paper named, “The road map to six sigma”, the basis of six sigma is explained i.e. defects not

more than 3.4per billion opportunities is to be produced[5]. Six sigma revolves around few key concepts which are process capability, variation critical to quality and stable operation[5]. Six sigma is considered as a process refining method within construction context[6]. The study also shows that six sigma no doubt have only positive impact on the construction industry if implements. It provides a broader quality concept, in-depth performance analysis, co-ordinate and iterative process improvement[6]. Though one cannot completely rely on six sigma for making all the construction process defect proof, as the industry includes lot of unpredicted and spontaneous situations and conditions. But overall six sigma can accelerates and reduce the defects in the construction industry[6]

Critical path method, one of the most commonly and widely used methodology in Indian construction. This methodology is not only limited to construction industry only but also widely use in various other segment. Project managers today rely on CPM to identify the total project duration and the activities float time[7]. This are the critical data of a project with further highlight how flexible the project could be from its planned schedule, details of critical and non-critical activities etc[7]. The CPM at the other hand is constantly been upgraded to cope up with the complexity and changing project scheduling[8].

Along with construction of concrete jungle, retention and development of natural jungle is of equal or even more important. The integration of sustainability into a project management methodology by following the standards practices and ISOs in a project is what the PRism methodology talks about and which is clearly mentioned in the research paper, “Evolving Project Management: The PRism Framework”[9]. By following the way paved by PRism methodology, a balance can be achieved between the limited resources, sustainability and social responsibility [9]. A study by Monica Gutierrez, shows that how PRism could be successfully implemented in a construction project and its impact on improving the process and its manipulation on the project outcome[10]. User guide from PRism by USAID is also beneficial in various ways in understanding the built environment sector. It also provides us with PRism tools and techniques such as PDT (Performance Diagnostic tool, OBAT (Organizational and behavioral assessment tool) and many more which could be used in the construction sector[11].

Prince2 methodology mainly focuses on the area such as project direction and project management in a construction project[12]. It is widely popular in UK and it’s been used across the globe both in private and in public sector[12]. This methodology has been developed to establish a hold over the

initiation, execution and termination of project[12]. Prince2 clearly sets the role and responsibilities of each individual in order to focus more on the end product that the project is supposed to deliver[12]. From the study of Thomas Streule, the significance of Scrum in Planning and design phase of a construction has been highlighted[13]. The research concludes with stating that Scrum has great potential in the above said phase with no adjustment made to the actual scrum framework which is been used in IT sector[13]. Scrum also emphasis on identifying and getting all the stakeholders on board by making them involved in the project from the start of the project itself[13].

III. METHODOLOGY

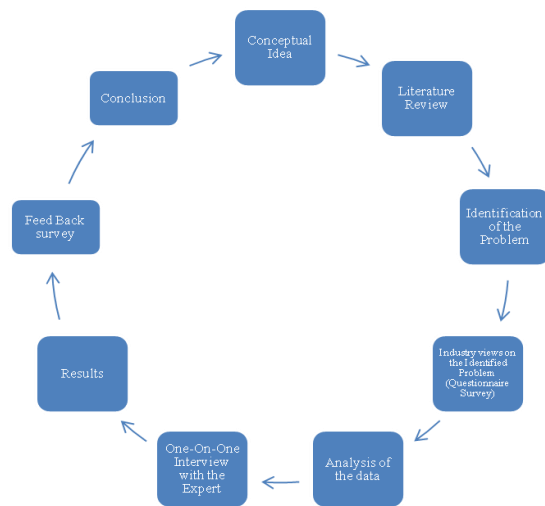


Fig. 1. Methodology cycle adopted.

a. Conceptual Idea

Randomly choosing a project methodology for any project put the project in a great risk when it comes to its successful completion. So, adapting a methodology which would suit the project and enhance its performance from the inception stage till it demolition is indispensable especially for Indian construction industry.

b. Literature Review

Study of the major methodologies available in the industry both for construction and manufacturing paved the way in showing how a specific methodology can shape the future of a project either positively or negatively. In the course, the methodologies studies were Lean, Six Sigma, PRism, Agile, Waterfall, Scrum, Kanban, Critical Chain project management, Critical path method, Prince2 and PMI/PMBOK.

c. Identification of the Problem

Consolidating the conceptual idea and the understanding from these methodologies, two major problem areas were identified:

Absents of a standard frame work for Indian construction industry and Low value given to project objectives.

d. Industry views on the identified problem

Based on the problem areas highlighted, a questionnaire survey was conducted so as to identify the industry needs and views on these problem areas and what all measures could be taken in order to bridge the gap. A small brief on all the specified methodologies were attached along with the questionnaire survey for professionals who are unaware of all the methodologies. A survey of 30+ industry professionals was documented.

e. Analysis of the Data

The survey result was all recorded and based on ranking method; conclusions were derived from the survey. Considering all other data, top ranks methodologies were selected and brought under process for further study.

f. Interview with the Industry expert

Based on the output obtained from the survey, list of questions was drafted for a one-on-one interview with the industry to understand their views and perspective on the obtained results from the survey and how to further streamline them.

g. Results

A framework was developed based on the data and the inputs received from various sources. The output obtained from the survey played a crucial role received in the development of the framework as the methodologies which were most preferred were given higher importance

h. Feedback survey

This survey was with an aim to ask the industry how successfully we can implement the proposed framework and what all additions and alterations could be accommodated to achieve the project objectives. The tools and techniques consolidated in the developed framework were again floated to the industry experts to obtain their views on its implementation.

IV. DATA COLLECTION AND ANALYSIS

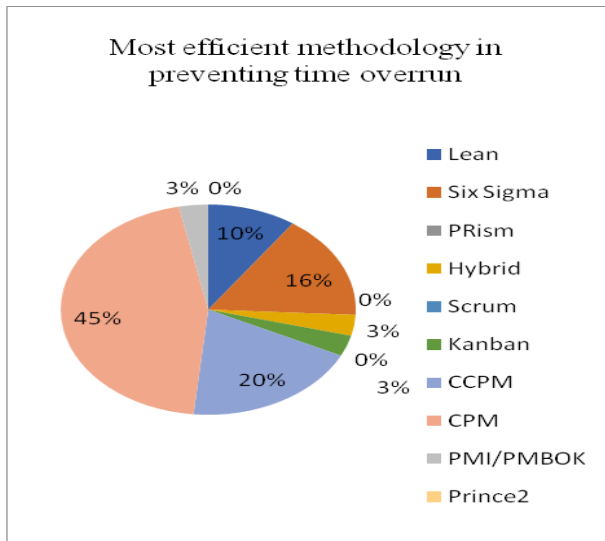


Fig. 2. Efficient methodology in preventing time overrun.

Conclusion from quality pie chart:

- Most preferred Methodology: Critical Path Method
- Least preferred Methodology: Scrum, PRISM, Prince2

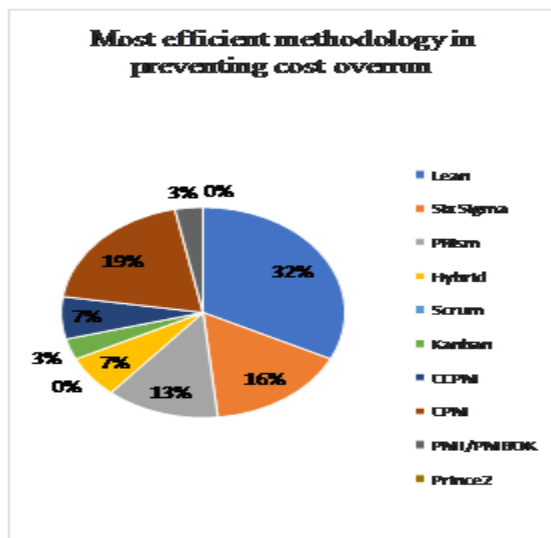


Fig. 3. Efficient methodology in preventing cost overrun.

Conclusion from cost pie chart:

- Most preferred Methodology: Lean
- Least preferred Methodology: Scrum & Prince2

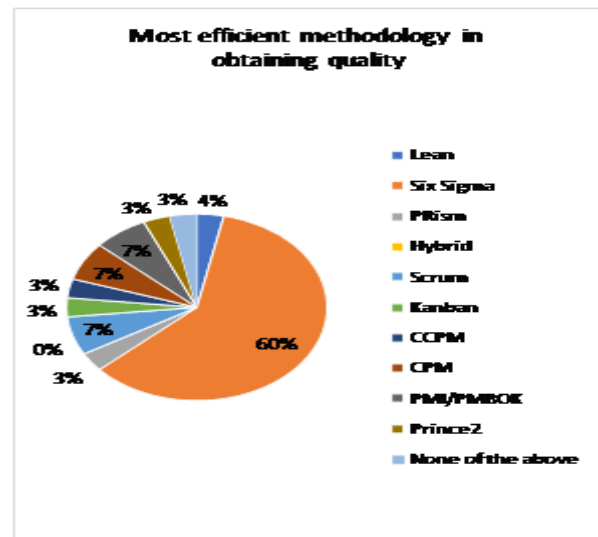


Fig. 4. Efficient methodology in obtaining quality.

Conclusion from quality pie chart:

- Most preferred Methodology: Six sigma
- Least preferred Methodology: Agile & Waterfall

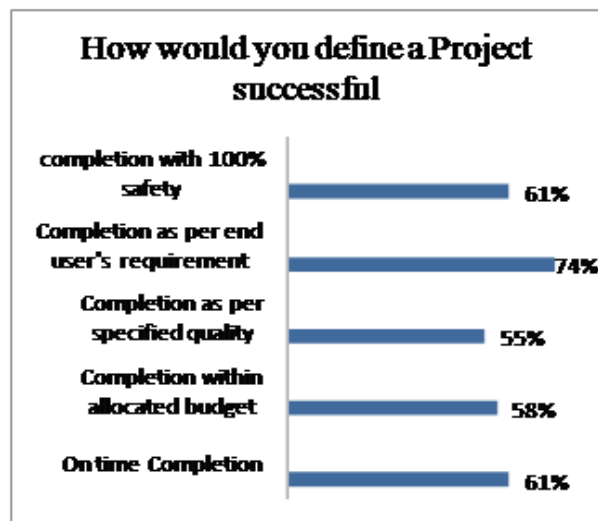


Fig. 5. Project successful parameter

Based on the survey, a project is defined successful when it is completed as per end user's requirement.

V. RESULTS

The proposed framework for Indian industry is developed keeping in mind factors such as cost effectiveness, easy to understand and implement and also other parameters such as its implementation at individual level as well as at whole project level. The Tools and techniques used in the framework are derived from the selected methodologies by the Indian construction industry professional. This tools are

simple are common process which have the capability to deliver high result but are often taken for neglected. So instead of focusing on minor improvements huge time and cost are invested in doing rectification of bad quality work, last minute modification etc. To start with the implementation of the framework, a basic induction has to be provided to the management and all the employees in order to get a hand over the tools and techniques and many of the tools are already well known to the industry. Workforce need not to be trained additionally but by involving them through to their day to day activities could be educated and involved in the value generating process.

TABLE 1 Proposed Framework for Indian Construction

Project Phase	Lean	Six Sigma	Critical Path Method
Initiation Phase	Setting of Project Objectives, principles and standards to follow		
Planning Phase		Value Stream Mapping	Critical path analysis Grantt Chart
Execution Phase	Kanban (pull System) Kaizen	5 whys (Root Cause analysis)	Earn value Analysis
	Daily huddle Meetings Visual Management, 5s		
	Kaizen Daily huddle Meetings	5 whys	

VI. CONCLUSION

From this entire project it is very clear that there is a huge gap between the awareness of the methodologies. Indian construction industry is reluctant in adopting new tools and technologies, instead continuing the existing or the one in which they are the expert is only preferred. The result of the survey also gets manipulated by the past experience of the professional, knowledge, interest and biasness towards one specific methodology. This resulted into highlighting only the known and popular methodology instead of other methodologies like Prince2, PRism, Scrum etc which were not even considered. This leaves us with the only option that the industry needs to be educated and upgraded because the techniques like lean are considered to be new only India whereas other countries are using it since ages.

VII. FUTURE SCOPE

- Implementation of the developed framework on a live project to check for its performance

- Study of cost incurred in implementing the framework in the form of development and training from top management till the lowest level of employee and workforce
- A study of time incurred in developing and training the management and the workforce to successfully proceed with the developed framework

VIII. ACKNOWLEDGMENT

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