



Article Title: The Construction Agile Managements of Different Infrastructure Projects

The Construction Agile Managements of Different Infrastructure Projects

B. Sreejith¹, V. Sreeja²

¹PG Student, Department of Civil Engineering, SIVAJI College of Engineering and Technology, Manivilai, Kanyakumari, Tamilnadu, India

²Assistant Professor, Department of Civil Engineering, SIVAJI College of Engineering and Technology, Manivilai, Kanyakumari, Tamilnadu, India

ABSTRACT

Agile methodology is a type of project management process, mainly used for software development, where demands and solutions evolve through the collaborative effort of self-functional teams and their customers. During the past few decades, fundamental changes have taken place in project development, planning, and execution. This has taken from with embracing new techniques such as various agile project management, instead of using the traditional waterfall project management. . It is mainly suitable for complex project, where there is delay in construction projects & final deliverable in advance. Construction delays are a common phenomenon in civil engineering projects. There are many reasons to delay in construction as pre-design, design and execution phase. It leads to time overrun in the construction work. Completion of construction projects on time seems to be challenging tasks in large-scale construction. It has been observed that about 90% of government infrastructure projects fail to achieve on time completion in India. Time is a major factor in construction and on time completion will bring about many benefits to the client, contractor and the society. This thesis paper will discuss and finding out the reasons for delay in two different construction project and apply agile management methodology where the delay is identified in this construction works. Also will prove the scope of agile management in construction industry in future.

Keywords: Agile project management, 2 phase project of infrastructure

1 Introduction

Agile project management has its roots in the software development industry, and it has developed through empirical progress. This methodology's uses are not limited to that industry. It defines values and principles that can be adopted by other industry as well. Moreover, it includes different tools and methods of conducting a project, which will lead to follow its values and principles. The agile methodologies are widely used by the software development industry where the customer recognized his need and improving it by repeated tests. A traditional concept of management, the responsibilities and authorities are defined in a hierarchy so if a middle level chain is broken than the ground level subjects are failed. In agile



Article Title: The Construction Agile Managements of Different Infrastructure Projects

concept, the basic belief is to keep all responsibilities & authorities on the same level such that even if there is a failure in single subject, the remaining subject can work efficiently in their sectors. Utilizing agile methods to develop and implement systems has improved the speed in which companies meet market demands. Given the relative newness of the agile project management approach, some research exists, but much more is needed to understand how the backbone components of agile project management can be used in a construction project development process.

1.1 Agile project management in construction

Application of agile project management is mainly seen in software industry which follows an iterative and incremental method which assures efficiency in the project by reducing the delay. Many researchers have been done on the application of APM during the pre-design and design phases of construction projects. It seems application of APM is laborious in the construction phase. The concept of agility is applied by dividing the entire project into smaller manageable parts and completing each part.

Some basic concepts of agility include:

- Avoiding inflexible processes that can't be changed.
- Using short iterative processes allowing for improvements to be quickly implemented or failures to be identified before the end product.
- Emphasizing learning and continuous improvement.
- Identifying issues and weaknesses as soon as they occur.
- Implementing root cause analysis to determine the cause of problems.
- Changing processes to suit specific projects, goals.
- Focusing on continuous training and mentoring.

2 Scope and Objective

The objective of this paper is to study the different literatures about agile management and identify the utilization of agile management in construction industry

The scope of paper includes:

- To study the traditional project management and agile project management principles related to construction industry.
- To study the effect of agile management in construction industry

3 Methodology

Literature study, questionnaire survey and case study analysis methods are followed for this thesis. The step by step methodology for this thesis is

- Study of literature to identify delay causes in infrastructure projects
- Delay analysis and ranking by survey method



Article Title: The Construction Agile Managements of Different Infrastructure Projects

- Case study analysis to identify areas of delay
- Application of APM.

4 Data Analysis

There are many delay reasons were identified from various literatures and analysis and ranking was done by conducting survey from which the relative importance index was found. The delays were then grouped to each phases of the construction projects and the major causes were identified. This step forms the basis to know the major delay factors were APM can be applied.

Relative importance index (RII) was found using the formula

$$RII = \frac{\sum W A}{N}$$

$\sum W$ – Weighting given to each cause by respondent ranges from 1 to 5 where „1“ is not significant and „5“ is extremely significant

A – Highest weight i.e. „5“ in this case

N - Total No. of respondents

4.1 Preliminary Data

4.1.1 Project No 1

Project name	Infrastructure work in Karakonam Medical Hospital; Kanyakumari district
Cost of the project	20 crore
Duration of the project	2 years
Client	Kerala government; health department
Fund distributor	NABARD
Works under	PWD
Delay duration	2years

4.1.2 Project No 2

Project no	2
Project name	Road construction from kunnamparai to Valvaithankoshtam. Antoniya's church road in valvachagostom town panchayat



Article Title: The Construction Agile Managements of Different Infrastructure Projects

Cost of the project	25 lakhs
Duration of the project	3months
client	Valvachagostom town panchayat
Works under	PWD
Delay duration	8 months before project starting 15 days after project starting

5 Survey Analysis

The survey adopted for this construction work 1 is the grade separator at Kerala. The survey conduct in a hospital infrastructure project. The client for this project was The Kerala Government as it was a state infrastructure project and the department involved was the Kerala health Department. The fund was provided by NABARD. The project was completed with a delay period of two years and the delay reasons were identified as follows:

- Land acquisition
- Slow decision making
- Suspension of work
- Late in revising documents
- Payment delay from client
- Subcontractor problem
- Site mobilization
- Planning issues
- Labour problem
- Recruitment of technical persons
- Complexity in design documents
- Unavailability of water
- Hot climate Lack of advanced techniques in management aspects

These delay causes were found to be affecting the project during the execution phase. The major delay reason was land acquisition. Land acquisition was not made before starting of the project and issues were brought up by the people of that area regarding the governments land acquisition policy and thus the delay period extended for about two years. The other mentioned problems also aided to the major problem and the client is found to be the major contributor. This is in contrast to the data analysis finding that the client is the main contributor even during the execution stage but the main reason still remains to be land acquisition. It is found that land



Article Title: The Construction Agile Managements of Different Infrastructure Projects

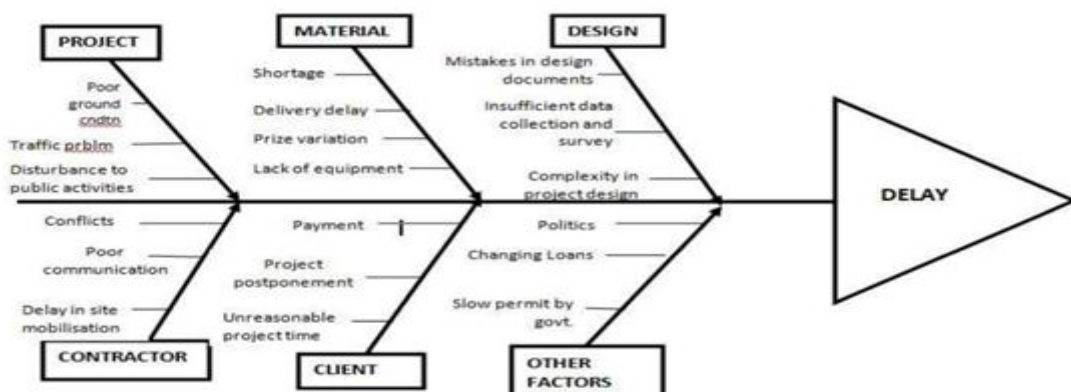
acquisition is a major delay contributor to most of the infrastructure projects. The fishbone diagram for the delay reasons of hospital infrastructure project is shown below.



The survey adopted for this construction work 2 is the grade separator at Tamilnadu. The survey conduct in a road infrastructure project. The client for this project was a town panchayat in Tamilnadu. The project was completed with a delay period 8months before project starting15 days after project starting and the delay reasons were identified as follows:

- Shortage of materials
- Delay in material delivery
- Material prize fluctuation
- Lack of equipment efficiency
- Conflicts between contractor and other parties
- Postponement of project by owner
- Traffic control and restrictions at job site

The fishbone diagram for the delay reasons of road infrastructure project is shown below.



6 Application of APM

From the Survey of project 1 and project 2, it was analysed that client contributed more to the delay reason during execution in contrary to the contractor from survey. The delay is mainly



Article Title: The Construction Agile Managements of Different Infrastructure Projects

due to owner's slow decision making and owner interference which shows improper planning by the client. The overall delay causatives were identified as

- Lack of communication
- Improper management
- Incompetent staff
- Mistakes in designing
- Lack of equipment efficiency
- Shortage of material

Based on the data survey following agile enablers or activators can be applied which will reduce the delay or time overrun. These enablers were obtained from literatures and modified as per construction projects1 and 2

➤ **Kick –off-meeting**

- Face to face conversation with pre-qualified consultants and client.
- Drawings are made is discussed with other consultants.

➤ **Scrum development**

- Self-supporting team with a scrum leader/head
- Workers involved in planning, executing, controlling, monitoring and report to scrum leader.
- Scrum team should try to follow iterative method.

➤ **Sprint meeting**

- After bidding the contractor should be signed agreeing that the AM framework by accepting for weekly meeting (40-45min) with consultants and daily meeting (10-15min) with site people.

➤ **Backlogs**

- Frame backlogs-shows the milestone to achieve, which act as a base of sprint meeting.
- Status of each milestone should be updated in the meeting like open, closed and processed

➤ **Fixed time**

- Fix a restricted time limit within the time limit provided by the client.
- The float between the restricted time limit and expected finishing time is flexible time.
- Create fixed milestones following same restricted time limit for each milestone providing float.

➤ **Short cycle planning**

- Prepare a flexible short cycle plan e.g for every milestone or major activity instead of detail full plan.



Article Title: The Construction Agile Managements of Different Infrastructure Projects

- Expect uncertainties and plan
- **Flexibility**
 - Flexible planning to achieve flexibility.
 - Proper forecasting of uncertainties.
 - Communication
 - Develop proper communication flow between the client, contractor and consultant/designer.
 - Develop inter and intra department communication.
 - Matrix communication for easier and faster communication.
- **Integration**
 - Follow integrated pattern.
 - No department should work alone.
 - Client, contractor and consultant coordination and integration is of key importance.
- **Iteration**
 - Follow iterative approach using scrum team wherever possible to check the defects and apply corrections in order to avoid rippling effects.
- **Technology**
 - Use of computerization.
 - Use of software for design and management.
 - Use of building management systems. → Continuous learning and updating
 - Continuous learning from each step to identify flaws and defects and apply in related methods in future.
 - Keep updated records of each work for future reference.

7 Conclusions

Agile project management is the advanced type of method used for construction project management instead of the traditional waterfall method. It can be reduce the construction delay and uncertainty in the construction projects and also give better customer satisfaction. It also reduces the time overrun in construction work. Agile project management is reduce the delay for about 70% to 80% as per the study based on survey in the two different infrastructure project. Further studies on actual implementation of the framework can be done. This modern management method can bring about reduction in delay achieving greater efficiency in construction projects.

References

1. Ajendra Kashikar; Devansh Mehta Bhawesh, Year: 2016, "A Case Study on Agile and Lean Project Management in Construction Industry", IOSR Journals, Vol: 13, pp. 31-39



Article Title: The Construction Agile Managements of Different Infrastructure Projects

2. Anand Jose Paul¹; Sherin K Rahman, Year: 2018, "Study on Agile Management in Construction Project Using Scrumban Methodology" IRJET, Vol: 05, pp. 774-777
3. Alex Ekstom; Emma Patterson, Year: 2016, "Agile Project Management in the Design Stage", Royal Institute of Technology, pp. 1-51
4. Blessie John, Year: 2018 "Framework of Agile Managements Sprint Planning Construction Projects – Afd Method"-Ijarnd, Vol: 03, no: 5.pp.88-93
5. Brittany Auerbach; Richard Mccarthy, Year: 2014, "Does Agile + Lean = Effective:An Investigative Study", Journal Of Computer Science And Information Technology, Vol: 2, pp.73-86
6. Chen Jin, Year: 2017, "Agile in Construction Projects", Harrisburg University of Science and Technology, pp.1-17
7. Cory Peter McDermott, Year: 2009, "The Future of the Construction Industry and the Implications Management and Education", Iowa State University, pp.1-107
8. Derya Bacheri; Linnea Hilmgren, Year: 2014, "Agile Perspectives in Construction Projects-How to Improve Efficiency in the Design Phase", Kth, Abe, Real Estate and Construction Management, pp.1-40
9. Dinnie Muslihat, Year: 2018, "7 Popular Project Management Methodologies and What They're Best Suited For", Zerkit, pp.1-25
10. Fei Han, Year: 2013, "Defining and Evaluating Agile Construction Management for Reducing Time Delays in Construction", Beijing University Of Technology, China, pp.1-105
11. Firas Glaiel, Year: 2012, "Agile Project Dynamics. A Strategic Project Management Approach to the Study of Large-Scale Software Development Using System Dynamics", Boston University, pp.1-126.
12. Fransisco Loforte Riberio, Year: 2010, "Exploring Agile Method in Construction Small and Medium Enterprises: A Case Study", Journal of Enterprise Information Management, pp. 1-3
13. Fred Wilson, Year: 2018, "Agile Construction Project Management –How To Be An Agile Construction Team?"
14. Hidayat Said Najmi, Year: 2011, "Project Management for Construction Projects", An-Najah National University, Nablus, Palestine, pp. 1-134
15. Jeff Totten, Year: 2017, "Critical Success Factors for Agile Project Management in Non-Software Related Product Development Team", Western Michigan University, pp. 1-140
16. Joao Carlos Ferreira, "Agile Approach in Project Management", Instituto Superior Technico, Av Rovisco Pais, Portugal, pp.1-6



Article Title: The Construction Agile Managements of Different Infrastructure Projects

17. Jonathan Adut, Year: 2016 “Applying Agile Approaches in Public Construction and Civil Engineering Projects”, Kth Industrial Engineering and Management, pp. 1-49
18. Juhary Alia, Year: 2004 “Knowledge Management in Agile Organizations”, Sunway College Journal 1, pp. 13- 20
19. Khaled Al-Reshaid; Nabil Kartam; Narendra Tewari and Haya Al-Bader, Year: 2005 “A Project Control Process in Pre-Construction Phases”, The Emerald Research Journals, pp. 351-372
20. Knoweldge Hund, Year: 2019, Blog Agile Project Management Vs Traditional Project Management, pp.1-16
21. M. Naim¹; J. Naylor²; J. Barlow, Developing Lean and Agile Supply Chains in the UK House Building Industry” Iglc-7, University Of California, USA, pp. 159-170
22. Mandeep Saini, Year: 2016 “Critical Factors for Transferring and Sharing Tacit Knowledge within Lean and Agile Construction Processes”, Emerald Journal, Vol: 18, pp. 64-89
23. Malik M.A. Khalfan; Peter McDermott and Michael Dickinson, Year: 2008, “Managing Risk and Uncertainty in an Agile Construction Environment: Application of Agile Building Specialist Model, International Journal Agile System and Management, Vol: 03, pp. 248-262.
24. Mattias Yllen; Johanson, Year: 2012, “Agile Project Management in the Construction Industry-An Inquiry of the Opportunities in Construction Projects” Kth, Abe, Real Estate and Construction Management, pp.1-59.
25. Maulik Pareliya, Year: 2019, “Implementing Agile Project Management Approach in the Development of Building Projects” Cept University, Ahmadabad. pp. 1-49.
26. Members of Apm North West Branch, Year: 2015, “The Practical Adoption of Agile Methodologies” Apm Volunteer Research Report, pp. 1-32.
27. Michael Jerrod Myers, Year: 2014, “Implementation of Agile Project Management in Class Room”, University of South Carolina, pp.1-43.
28. Milind Padalkar, “Using Agile in Construction Project: It’s More Than Methodology”, Iim, Kozhikode, Kerala, pp. 1-10
29. Mishkin Berteig. “Agile Work Uses Lean thinking”, Berteig Consulting Inc, pp. 40-46.