Paper ID: URP 0123

Implementation, Challenges and Advancement of Agile Project Management in Modern Projects

M. T. Mahi[1], M. A. Islam[2], M. A. H. Talukder[3]

[1]Department of Building Engineering and Construction Management, RUET, Bangladesh (md.tanvinmahi@gmail.com)
[2] Department of Building Engineering and Construction Management, RUET, Bangladesh (writingakib@gmail.com)
[3] Department of Building Engineering and Construction Management, RUET, Bangladesh (niloyhaque99@gmail.com)

Abstract

Agile Project Management (APM) approaches are being adopted by the construction sector more often to deal with the complexity and uncertainty that come with large-scale projects. APM is a flexible, iterative method that places a focus on adaptability, continuous improvement, and consumer engagement. This essay examines the development of APM in the construction industry, emphasizing its core principles and benefits while contrasting it with traditional project management (TPM). The report also includes a case study of an infrastructure project for an Indian hospital that illustrates how APM may decrease delays and increase stakeholder satisfaction. The study concludes by outlining the main success factors and difficulties of applying APM in the construction sector and arguing that APM has the ability to completely reshape project management methods worldwide.

Keywords: *Project management; Agile project management; agility in construction; project complexity; critical success factors.*

1 Introduction

As APM is a very important term in a project's management, it suggests breaking a complex project scenario into many iterations. Iterations divide the project into manageable tasks. Each task performs a set of functions within a timeframe. Project team and stakeholders plan, execute, and evaluate each iteration. Open communication, feedback, and flexible expectations are encouraged in this environment. Agile project management adapts to changing needs. APM delivers client value through flexible planning, fast interaction, repetitive changes, and high collaboration and involvement.(Chin, 2004) The Agile methodology's biggest advantages are managing variable needs, visibility of project, alignment of businesses, rapid delivery, increased productivity, contentment of customers, and minimized project risk. Construction projects are sequential and expensive to alter as the project progresses, therefore iterative methods are not suitable. However, when structures get increasingly complex, a framework that fosters regular input may greatly minimize risk. BIM allows non-linear iterative processes on typical 2D workflows.

Both BIM and agile management offer comparable results. Building information modelling may support agile management with the technology foundation for model(s) as well as information to be exchanged within the team members and because it is a comparable methodology.

Agile project management is a new methodology, and BIM may assist the building sector embrace it. 28% of global projects are agile, according to the 2014 Global PMI Global study. Agile methodologies aim to switch comprehensive up-front planning with evolving strategies that incorporates the latest project data management, establish quality early, address technical risks early, reduce the negative effects of requirements changes, provide frequent and continuous business value, trust and empower employees, foster teamwork, and maintain open communication.(Highsmith, 2004)

2 Principles of APM:

17 software engineers reunited at Snowbird Ski, Utah, in 2001 to discuss the key principles of methods for agile development. The Agile Manifesto was formed during this conference, and it offers the framework for agile project management the way we recognize it today, consisting of 12 principles and four core values (Bergmann & Karwowski, 2019):

a. To value officials and inter-communications more than tools as well as procedures.
b. To prioritize functional goods above detailed documentation.
c. To value customer involvement above contract negotiations.
d. To value adaptation to changes rather than sticking to plans.

Principles (Mohammed & Jasim, 2018):

1. The main objective is to meet the needs of the consumer by consistently and rapidly delivering high-quality goods.
2. Agile approaches always accept variable needs.
3. Provide durable products regularly from weeks to months preferring a shorter duration.
4. Over the course of the project, businessmen and engineers must collaborate frequently.
5. Establish plans considering the motivated people. Provide them with the required supportive environment and encouragement and allow them to do the task.
6. Vis-a-vis interaction is a more effective and productive way of sharing knowledge between members of a project.
7. An elementary sign of progress is workable products.
8. This approach fosters long-lasting growth. Developers, sponsors, and consumers should be capable of keeping up the pace simultaneously.
9. Frequent dedication to technological fineness and smartness improves agility.
10. Simple thinking is vital which is defined as "the way of optimizing numbers of tasks not done."
11. High performance teams create the highest-quality architectural designs, necessities, and plannings.

3 Comparative analysis between APM and TPM:

The PMBOK Guide provides guidelines for typical project management. Typical project management is known as "a bunch of techniques in conjunction with resources implementing on a task aiming at an ultimate product or results" by the PMBOK guide. It is defined as a method of top-down leadership in which all instructions and tasks are determined at the highest levels of upper management and then flowed down through the company. A plan is created at the start, with little scope for changes afterward.

Typical project management presumes that events will be foreseeable, that all procedures and tools will be entirely comprehended, and that finished phases will not be repeated. The well-structured procedure and the emphasis on requirements are two of this approach's strengths. It quickly runs into limits since projects seldom follow the ideal sequential flow and clients are often unable to identify all their needs at the start of the project. (Hass, 2007)In today's developing and complicated project context, inadequate flexibility is a drawback. Also, the project manager is solely responsible for ownership.

On the other hand, APM is a greatly iterative and developing method in which shareholders as well as developers work-together closely to understand the area of influence, identify demands, and prioritize parameters.

The agile methodology is comprised of several quick iterative design and development cycles. This enables regular assessment of interim findings and, therefore, adjustments if the stakeholders and users demand it. Consequently, the output is constantly upgraded by all the working members of the project, including stakeholders. This method
The agile methodology is comprised of several quick iterative design and development cycles. This enables regular assessment of interim findings and, therefore, adjustments if the stakeholders and users demand it. Consequently, the output is constantly upgraded by all the working members of the project, including stakeholders. This method offers quick product revisions as previously unpredictable requirements are found.

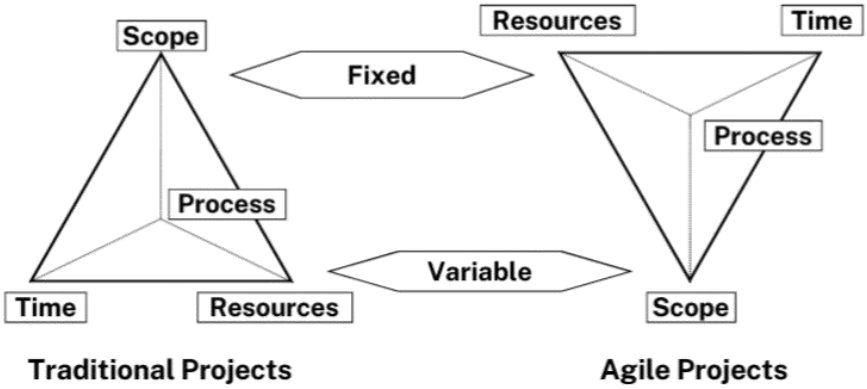

Figure 1. Comparison between traditional and agile projects.

4 Case study of an Indian Hospital Infrastructure Project:

After categorizing the delay causes into project phases1 by relative importance index, it was discovered that the building phase had the most delays. (Gopika & Sahaya Nisha, 2020)

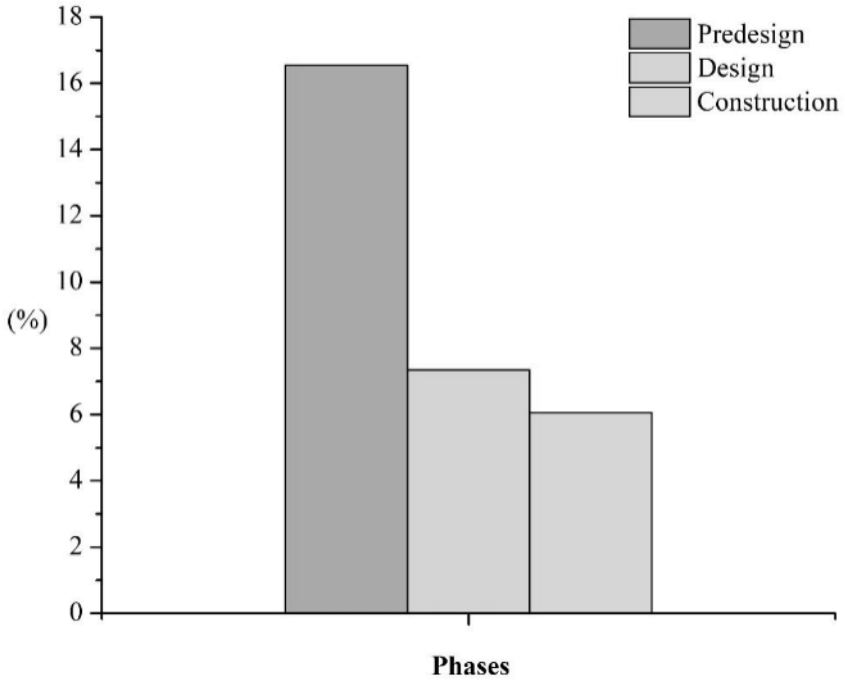

Figure 2. Chart on classification of delay factors depending on project phases.

Client, consultant, and contractor are all parties involved in a construction project. Delay factors are classified according to contributor, with the client contributing mostly at the phase of pre-design, followed by the client and
the consulant during the phases of construction and design.

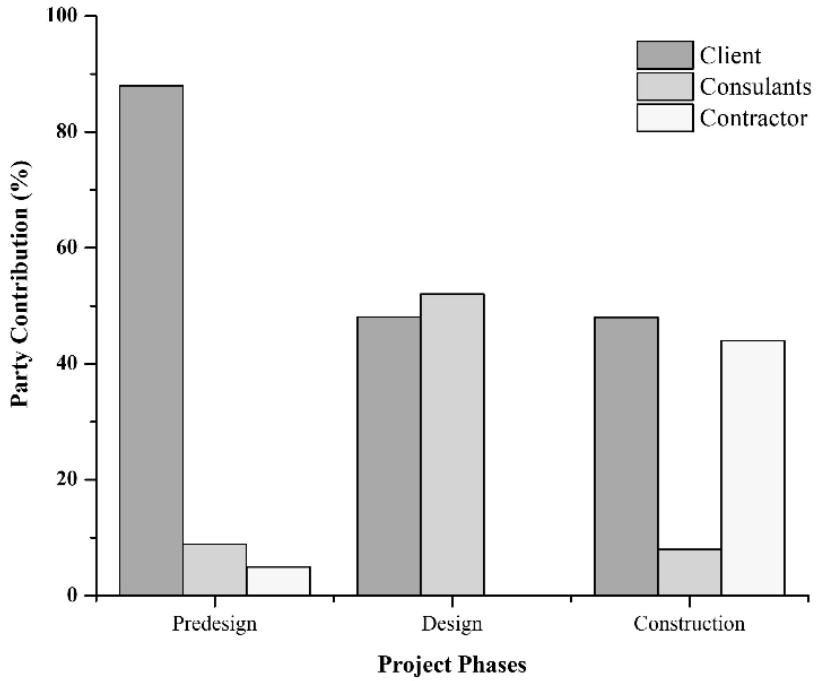

Figure 3. Chart on parties' contributions at pre-design, design phases along with the construction phase.

Since this is a general data analysis, the degree to which each project contributes will vary depending on the specifics of the circumstances. It was determined that the client was accountable for around 88% of the pre-design phase delay in the infrastructure project, with the consultant bearing the liability for the remaining 9%. It shows that over the design stage, the consultant is responsible for around 52% of the postponement, with both the client and the contractor responsible for around 48%. The final statistic for the construction phase showed that the client was responsible for 48% of the total delay, the contractor for 44%, and the consultant for a negligible 8%.

While land acquisition is still the key cause, this contradicts the analysis's conclusion that the client is the leading contributor throughout the execution stage. It has been verified that land is one of the main reasons why infrastructure projects go behind schedule. The following fishbone graphic illustrates the causes and impacts of hospital infrastructure project postponement.

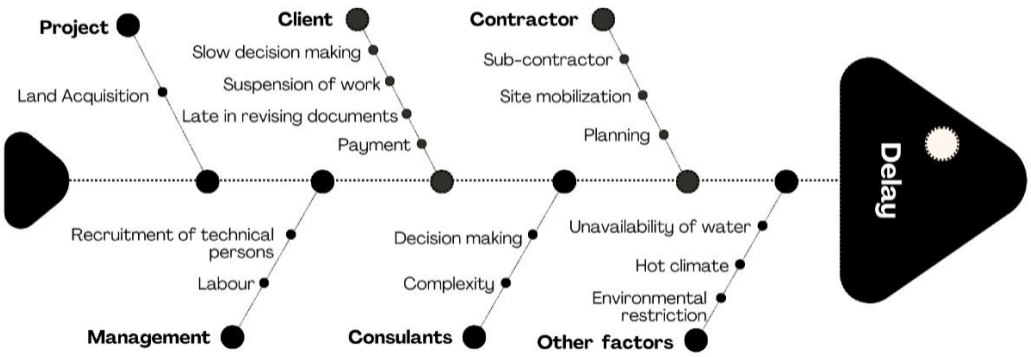

Figure 4. Fishbone diagram showing the causes and impacts of delay of the project.

Constant time, brief cycle strategic planning, adaptability, interactions, cooperation, iteration, technological advances, continuous improvement, and upgrading are all examples of agile facilitators or activators that may be used to complete a project on time and within budget. Developing inter-departmental communication and

utilizing matrix communication may be a great technique for stakeholders to communicate more quickly and easily. Computerization, software, and building management systems are required for design and management. Finally, constant learning and updating would be effective in each phase to spot problems and apply relevant strategies in the future.

5 Success and challenges:

5.1 Key success factors:

The factors of critical success (CSF) are features or conditions that, if effectively managed, have a substantial effect on the success of a project. This technique has been studied for over 30 years, still no agreement on the success criteria of project has been found.(Fortune & White, 2006) Project managers must define relevant success criteria, as well as adequate components and management methodologies. The success criteria are more concerning "hard" issues related to schedule, money, execution of projects, and customer satisfaction, whereas influencing elements are more concerned with human resources. (Alexandrova & Ivanova, 2013)Most studies continue to emphasize the classic "iron triangle" of cost, quality, and timeliness, but scope and customer satisfaction must also be considered (Bergmann & Karwowski, 2019).

5.2 Overall challenges in implementing APM in construction:

Due to fixed assembly sequences and variable operations, construction projects have difficulty in adjusting to changes.(Chen et al., 2007) Agile Project Management (APM) strives to decompose project complexity and promote adaptability. Traditional Work Breakdown Structure (WBS) is still utilized for project delivery, though. A functional WBS can give project managers and clients with visibility and control.(Chen et al., 2007) Agile processes and methodologies necessitate small, interactive multidisciplinary teams that communicate well.
Agile Project Management (APM) encounters difficulties such as task scheduling, scope monitoring, knowledge management, and people issues.(Masood & Farooq, 2017) Agile approaches prohibit comprehensive specifications, which leads to risks such as price fluctuations and cost increases. The implicit knowledge management of APM makes knowledge transfer across enterprises difficult. Cooperation, communication, and collaboration among stakeholders and project teams are vital to success. Before implementing APM methodologies, organizations must undergo transformation, altering structures, cultures, and systems. People-related issues can be difficult to manage in geographically dispersed locations and large projects due to the requirement for trust, collaboration, and cohesiveness among team members and stakeholders.

6 Benefits in construction industry:

Researchers have identified that the effects of success variables might alter depending on the phase in a project's lifespan. In an additional study, the initial elements (time, expense, and standard) were advanced by three more dimensions: (i) satisfying business ambitions of clients, (ii) attaining contentment of target users, and (iii) gaining the fulfillment of relevant shareholders. Besides, the benefits of the APM include (Ciric et al., 2018),

• Better flexibility.	• Enhancing teamwork and project performance.
• Reduced planning period.	• Minimizing errors and reworks.
• Establishing the program plan collaboratively through shared accountability.	• Optimizing project duration and expenses.
• Improved interactions and collaboration among project partners.	• Quickly move across groups on one or multiple building sites.
• Better comprehension and execution of project specifications.	• Improving client contentment.

7 Results and discussion:

Traditional project management (TPM) suffers difficulties such as cost and time overruns, making it difficult for any project’s revision or changes. While APM is a repetitive method, it allows the project owner to review and adjust outputs to suit the needs of the client.(Rodgi & N. Bhirud, 2021) This strategy is more user-friendly and seeks to satisfy all stakeholders, making it a better option.

So, according to the objective, obstacles of this review of agile project methodology, it will provide insights into the problems that businesses experience when implementing agile project management, as well as the benefits of doing so.

8 Conclusion:

Agile management of projects is a more advanced method of managing construction projects than conventional project management. It could mitigate construction delays and uncertainty and increase customer satisfaction. It also decreases the excessive time and delays in construction projects by around 70 to 80%. This modern management approach can ensure the completion of projects within the optimized budget and time, resulting in increased productivity.

References:

Alexandrova, M., & Ivanova, L. (2013). *CRITICAL SUCCESS FACTORS OF PROJECT MANAGEMENT: EMPIRICAL EVIDENCE FROM PROJECTS SUPPORTED BY EU PROGRAMMES*.

Beck, K. L., Beedle, M. A., van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., Grenning, J., Highsmith, J., Hunt, A., Jeffries, R., Kern, J., Marick, B., Martin, R. C., Mellor, S. J., Schwaber, K., Sutherland, J., & Thomas, D. A. (2013). *Manifesto for Agile Software Development*.

Bergmann, T., & Karwowski, W. (2019). Agile project management and project success: A literature review. *Advances in Intelligent Systems and Computing*, *783*, 405–414. https://doi.org/10.1007/978-3-319-94709-9_39

Chen, Q., Reichard, G., & Beliveau, Y. (2007). INTERFACE MANAGEMENT-A FACILITATOR OF LEAN CONSTRUCTION AND AGILE PROJECT MANAGEMENT. In *Proceedings IGLC* (Vol. 15).

Chin, G. (2004). *Agile project management: how to succeed in the face of changing project requirements. .* AMACOM Division of American Management Association International.

Ciric, D., Lalic, B., Gracanin, D., & Zivlak, N. (2018). *Agile Project Management in New Product Development and Innovation Processes: Challenges and Benefits Beyond Software Domain*. https://doi.org/10.1109/TEMS-ISIE.2018.8478461

Fortune, J., & White, D. (2006). Framing of project critical success factors by a systems model. *International Journal of Project Management*, *24*(1), 53–65. https://doi.org/10.1016/j.ijproman.2005.07.004

Gopika, K. S., & Sahaya Nisha, J. (2020). IMPLEMENTATION OF AGILE MANAGEMENT IN CONSTRUCTION OF DIFFERENT INFRASTRUCTURE PROJECTS. In *International Research Journal of Modernization in Engineering Technology and Science*. www.irjmets.com

Hass, K. B. (2007). *The Blending of Traditional and Agile Project Management Waterfall Model Figure 1: The Waterfall Project Life Cycle Model*. http://www.pmworldtoday.net

Highsmith, J. (2004). Agile Project Management: Creating Innovative Products. *The Agile Software Development Series*.

Lappi, T., Karvonen, T., Lwakatare, L. E., Aaltonen, K., & Kuvaja, P. (2018). Toward an Improved Understanding of Agile Project Governance. *Project Management Journal*, *49*(6), 39–63. https://doi.org/10.1177/8756972818803482

Masood, Z. A., & Farooq, S. (2017). *The Benefits and Key Challenges of Agile Project Management under Recent Research Opportunities The Benefits and Key Challenges of Agile Project Management under Recent Research Opportunities View project*. 20–28. http://www.irjmsjournal.com

Mohammed, S. R., & Jasim, A. J. (2018). Examining the Values and Principles of Agile Construction Management in Iraqi Construction Projects. *Journal of Engineering*, *24*(7), 114–133. https://doi.org/10.31026/j.eng.2018.07.08

Rodgi, H. S., & N. Bhirud, A. (2021). An Implementation of Agile Project Management in Construction Projects –A Review. *Journal of Emerging Technologies and Innovative Research (JETIR), May 2021, Volume 8, Issue 5*.