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Muhammad Ahsan Raza Siddiqui, Shah Muhammad Kamran
and Arshad Ali Memon

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Application of Agile Project Management Approach in Construction Projects: An Experimental Research

Muhammad Ahsan Raza^a, Dr Shah Muhammad Kamran^b & Engr Arshad Ali Memon^c

^a Scholar, MUISTD, MUET, Jamshoro, Hyderabad, Pakistan

^b Assistant Professor, MUISTD, MUET, Jamshoro, Hyderabad, Pakistan

^c Assistant Professor, Civil Department, MUET, Jamshoro, Hyderabad, Pakistan

Abstract

The convolution of construction projects is the main reason, the construction industry is exploring a better way of managing construction projects. Mostly construction project management is based on the waterfall model which has a fixed structure and the changes are not so simple. This study aims to find the impact of the Agile Project Management approach and differentiate it from Waterfall traditional model. Agile is a new approach originally designed for IT projects which helps to accomplish the goals efficiently and overcome the hurdles. Available to the literature confirms the implementation of the agile approach into non-IT projects and working efficiently and achieving the milestones smoothly. This research used an experimental approach in which two different construction projects are taken and both approaches were applied, one is the Agile approach and the other is the waterfall model. Progress of work is measured through a customized mobile application which helps to maintain records and comparisons. In conclusion, it is estimated that the Agile approach has considerable potential outcomes for construction projects it reduced the cost and consumed less time rather than the waterfall model.

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Keywords: *Agile Project Management (APM), Waterfall Model (WFM), Information Technology (IT), Project Management (PM)*

1. INTRODUCTION

House is an integral part of our life it provides us shelter, security, and identification. It provides us with a better way of living. The demand for new houses is interlinked with the population. The requirement for new houses is measured after the census. To fulfill such requirements public and private construction companies launching the housing societies. The construction industry supports the economic growth of the country as well as provides employment opportunities. like there are more than 40 industries are involved in single house construction. In the construction project, there are various small industries are linked with the building manufacturing industry.

Overall, the world, the construction industry is considered as one of the major explode industries. The building manufacturing industry is also a main source of employment it provides career opportunities to a huge number of the unskilled and skilled workforce. space is a necessary part of human life and the government should have to provide a certain space for everyone. To implement the solution for these issues current government authorities have pledged to construct 5 million new residential houses in its five years term for the people of pakisatan.

1.2. Hyderabad Population and Housing Demand

Hyderabad is the former capital of Sindh and 2nd largest city of Sindh. census 2017 indicated that the population of Hyderabad is exceeded 2 million (Census, 2017). This indicates that the requirement of the new houses is increasing.

Hyderabad is a densely populated city. The density of Hyderabad's population is 1897 Density of pr sq km (Population Welfare Department, Sindh). Pakistan's Construction sector provides up to 380 billion PKR in GDP (PES, 2020-21). Khali, I., & Nadeem., (2019) forecasted that the requirement of new housing units per year is 350,000 and it is incremented by 400,000 units per annual in the near future.

Jabeen et al (2015) indicated that in Pakistan 2011, the urbanization level was 36.2, while there were 21.7 million residential houses units in the country as against the population of 186 million. Pakistan is facing a deficiency of 9 million residential houses, which is on growing with a proportion of 600,000 annually.

According to the world population review, the population of Hyderabad is 1,386,330 in 2020. Hyderabad is 2nd largest city in Sindh and the 6th largest city in Pakistan. The necessity of house is increasing day by day. Due to the lack of living space, new colonies are planned throughout the entire country. Hyderabad is divided into two parts older part and the newly planned part. The older part contained British era buildings, congested roads, and poor drainage system while shah Latifabad, Qasimabad is established after independence having wider roads proper drainage system, and having other facilities

1.3 Project

A Project is a series of task and endeavor practices in which starting and ending deadlines are defined. Its means a milestone has been declared in the planning phase. Project means to generate or make something innovative within specific timelines like a product or service. Project is accomplished through different phases like planning, initial stage, designing, supply chain, and so on. Project completion is depending upon team collaboration. So, Management is an integral part of a project. Project Management is the set of awareness, tools, skills, techniques, and approaches that are used to meet the project requirement.

1.4 Project Management Approaches

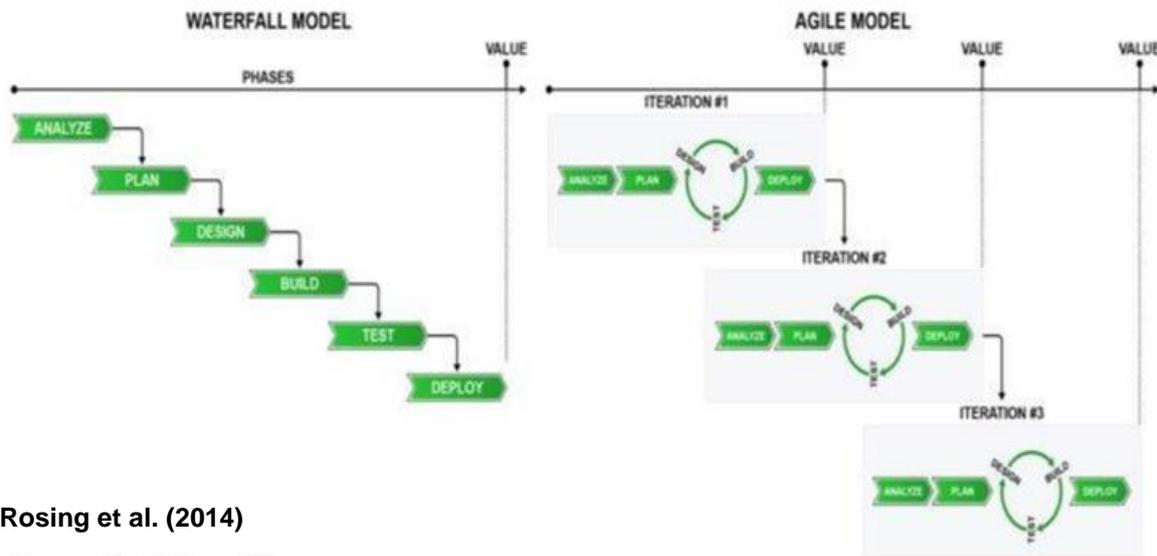
Project management is knowledge, tools, and techniques used for the specific purpose to deliver something of value to people. Project management is to manage the projects to accomplish their milestones within budget. There are different types of project management approaches.

1.5 Waterfall (Traditional) Model Approach

The waterfall model is also known as the traditional model. It is based on a sequential model through which activities are interlinked with other activities. The changing waterfall model is not easy because all the task is assigned in the planning phase that's why changing in the waterfall is complicated and it may affect the progress of the project. A stakeholder is not involved in project initiation that's why the waterfall model is not flexible.

1.6 Agile Project Management Approach

The agile model is flexible it is focused on client demand and client involved every stage of a project that why it is more productive than waterfall. The agile model is based on increasing progress which is also known as the iterative process. Therefore, the stakeholder and team know exactly what is accomplished and what is not. It helps to tackle down and reduce risk in the development process. Agile methodologies used in system development. Agile development is part of the reaction against traditional waterfall methods.



Von Rosing et al. (2014)

2 CONSTRUCTION PROJECT

A Construction project approach refers to a set operation that is used to generate a project from ground to top and make it sure to accomplish the goal in the timeline. Projects have a complex but flexible framework in which processes are done smoothly. The major objective of the construction management approach is the satisfaction of the client's demands for a viable project both in terms of functionality and budget. When the Approaches of construction are implemented successfully, the entire project team is motivated and actively involved in their learning and produces high quality of work.

2.1 Agile approach in Construction Projects

SA et al., (2020) Indicated that the Agile project management approach is the new and enhanced method mainly used for software now successfully implemented in construction projects. Implementation of the agile approach can be reduced the construction processes' delay and uncertainty in the construction projects and also give customer satisfaction. It also reduces the time overrun in construction work. Agile project management decreases the cost and helps to reduce the delay by about 70% to 80% as per the study based on a survey in the two different construction projects.

3 Methodology

This research aims to implement the (Agile approach) new project management approach in construction projects. To measure the effectiveness of the agile approach in the construction project. The aim was achieved through the following objectives:

1. To apply the agile project management model in construction.
2. To evaluate the milestones of an ongoing project and analyze the productivity of the agile model
3. To measure the effectiveness of the model and the performance of the project.

This study was conducted using the quantitative research method. The study was based on two project management approaches, the Waterfall model which is also known as the traditional model, and the Agile project management

model. Both models were applied to two different construction projects. Progress is collected through mobile applications.

4. Literature

Mohammad et al., (2020) linked that the agile approach is the new and updated technique to manage the impact of change and increase the maximum values and as well as control the risk and those changes. Agile is an increasing process to manage, plan and navigate the process of the entire project in any type of industry. Indicated that Agile Project Management surge the productivity of project, as well as strategies of Agile Project Management approach, is more effective in the term of entire project execution like, Continues improvement, monitoring and evaluation of milestones, flexible workflow, engagement of stakeholder (Arefazar, et al , 2019). Sojan et al., (2019) described the impact of agile project management that agile project management significantly improve the progress of construction industry project and it is also beneficial. Ahmed et al (2019)., Agile management is a series of work. In which activities are interlinked with each other it is used to create prioritized project backlog, planning, review, procedures, mitigate risks that help the project to accomplish on the timeline. Mohammad et al., (2019) discuss that Agile project management was originally developed to improve the way of software projects. But the agile framework is imposed in construction projects. Iterative concepts of agile are applicable in construction projects planning, data acquisition. Pareliya et al., (2018) linked that Agile Project Management helps to decrease the time waste, uncertainty, and risk involved during the construction projects planning and executing phase. it is also focused on managing the time and daily and regular meetings, which will be favorable to keeping track of the project's progress. John, B. (2018) Linked that agile management made valuable effects on reducing and managing the changes during the construction project. Paul et al., (2018) explored that agile is effective for the construction project development process both horizontally and vertically throughout the entire project life cycle. Agile adopt and implement innovation through high performance and ensure working value by direct stakeholder involvement in the overall entire process. Paul et al., (2018) explored that agile is effective for the construction project development process both horizontally and vertically throughout entire project life cycle. Agile adopt and implement innovation through high performance and ensure business value by direct client involvement throughout the entire delivery process. Moriel et al., (2017) indicated that adoption of agile project management in construction is favourable in the sense of building design and help to surge the progression by implementing new processes and it also help to improve communication within team that may help to accomplish a task in a more efficient manner. Thomas STREULE et al., (2016) Indicate that the outcomes from this study show that the agile approach has great potential in the planning and design phase of the project. Ekström et al., (2016) This study indicates that any type of construction project may adopt and apply the agile mindset and it is mandatory that the whole organization relates to the agile approach mindset to gain greatest outcome. Stráusser, G. (2015) indicted that agile project management approach is successfully implemented in the residential construction projects and the outcomes are better than the expectations project successfully completed within budget and estimated time. Riberio et al., (2010) According to the paper it is assessed that agile method offer desirable potential for application in construction and also agile methods offers benefits beyond any individual company. Chen et al., (2007) Links that agile project management (APM), achieving success and gain great progress. This study considerable that agile project management approach is applicable in the construction project. Owen et al., (2006) This study indicated that the outcomes of adoption of agile project management approach in the design phases can easily facilitate and manage the processes and facilitate the entire project and generate creative solutions in complex conditions. Agile project management is supportive for those firms/organization who want to explore adopting the changes for encouraging to enhance working productivity

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6 Conclusion

Agile Project management is a more effective approach with respect Waterfall Model. The findings of the study are in line with the study of the different researchers **who** stated that “agile project management significantly improve the progress of construction industry project and it is also beneficial”. The agile Project Management approach can easily manage to limit and decrease the time-wasting, and also tackle down the involvement of risk during the entire construction phase. It is also focused on managing the time and daily meetings, which will be beneficial to keeping track of the project’s progress. Construction project managers can easily use the agile approach as a standpoint that can be applied. Implementing an agile project management approach is seen to have considerable outcomes if it is applied in the sprint planning phase. There are various software’s are available for implementing the agile approach like JIRA, ClickUp, etc. In this research, ClickUp is used for agile approach implementation and MS Project is used for Waterfall / Traditional Model implementation. Mobile application is used for tracking the daily progress of work.

References

- Von Rosing, M., Von Scheel, H. & Scheer, A.-W. 2014. *The complete business process handbook: body of knowledge from process modeling to BPM*, Morgan Kaufmann Title of Appendix A
- (Khali, I., & Nadeem, U. (2019). Optimising the Naya Pakistan housing policy opportunity (No. 1). Working Paper
- Jabeen, A., Sheng, H. X., & Aamir, M. (2015). Housing crises in Pakistan: Review of population growth and deficiencies in housing laws and policies. *International Journal of Sciences: Basic and Applied Research*, 24(3), 323-347.
- SA, G. K., & Nisha, J. S. Implementation of Agile Management in Construction of Different Infrastructure Projects.
- Mohammed, K. N., & Chambrelin, K. S. (2020). An analytical approach in usage of agile methodologies in construction industries—A case study. *Materials Today: Proceedings*.
- Arefazar, Y., Nazari, A., Hafezi, M. R., & Maghool, S. A. H. (2019). Prioritizing agile project management strategies as a change management tool in construction projects. *International Journal of Construction Management*, 1-12.
- Sojan, S. K., & Ajayakumar, A. (2019). AGILE MANAGEMENT IN CONSTRUCTION INDUSTRY.
- Ahmed, M. N., & Mohammed, S. R. (2019). Developing a Risk Management Framework in Construction Project Based on Agile Management Approach. *Civil Engineering Journal*, 5(3), 608-615.
- Mohamed, B., & Moselhi, O. (2019). A FRAMEWORK FOR UTILIZATION OF AGILE MANAGEMENT IN CONSTRUCTION MANAGEMENT.
- Pareliya, M. (2018). Implementing Agile project management approach in the development of building projects.
- John, B. (2018). Framework of agile management’s sprint planning in construction projects—AFD method. *International Journal for Advance Research and Development*, 3(5), 88-93.
- Paul, A. J., & Rahman, S. K. (2018). Study On Agile Management In Construction Project Using Scrumban Methodology.
- Moriel, R. S. (2017). Feasibility in Applying Agile Project Management Methodologies To Building Design and Construction Industry.

Streule, T., Miserini, N., Bartlomé, O., Klippel, M., & De Soto, B. G. (2016). Implementation of scrum in the construction industry. *Procedia engineering*, 164, 269-276.

Ekström, A., & Pettersson, E. (2016). Agile project management in the design stage—Construction projects possibilities to apply agile methods.

Ribeiro, F. L., & Fernandes, M. T. (2010). Exploring agile methods in construction small and medium enterprises: a case study. *Journal of Enterprise Information Management*.

Sträusser, G. (2015). Agile project management concepts applied to construction and other non-IT fields. Project Management Institute.

Chen, Q., Reichard, G., & Beliveau, Y. (2007). Interface management—a facilitator of lean construction and agile project management. *International Group for Lean Construction*, 1(1), 57-66.

Owen, R., Koskela, L., Henrich, G., & Codinhoto, R. (2006). Is agile project management applicable to construction? IGLC.