Study of Advance Construction Techniques to Manage the Cost & Time Aspect for High Rise Buildings

Darshan Vyas[1] Jitendra Patel[2]
[1]Student [2]Assistant Professor
[1,2]Indus Institute of Technology & Engineering

Abstract— Time & Cost overruns has been a noteworthy issue in numerous Indian High rise construction projects. The successful execution of construction activities and keeping them within recommended plan and cost is imperative for compelling time execution and cost execution. This thesis work is done on concentrating on Reasons of Time & Cost overruns in Indian High Rise construction industry. A valid questionnaire for the overview was produced taking into account reasons for time & cost overruns recognized from writing survey. The information from the survey was broken down measurably. Construction project managers/engineers were surveyed to identify which construction activities in each category cause the most time & cost overrun. The result accomplished from the survey revealed that the major cause for time & cost overruns are during construction execution time only. Study of advance construction techniques and utilize for control the time & cost overrun.

Key words: High rise construction, Cost overrun, Time overrun, Advance construction techniques, Advance materials

I. INTRODUCTION

First phase the literature sources, the theories, principles, strategies, trends and growth of high rise construction. Which provides a base of high rise construction methods and time & cost overrun knowledge and supports the decisions undertaken for achieving the objectives. Need for the research is presented after going through the literature review. Next phase of the survey plan mulled over the destinations of the study with the mean to answer the examination questions. Awesome exertion and conceptualizing were finished planning the questionnaire. Gatherings with individuals from the business were led to distinguish the right inquiries required and to present them in an unmistakable and an unambiguous configuration. Extraordinary care likewise was finished stating the inquiries that is effectively comprehended by respondents. It describes the methods and techniques used at the stage of data collection and interpretation.

Studying & understanding the advance construction techniques & materials through a case analysis of survey. The chapter evaluates the advance construction techniques & materials to control time & cost overrun through a process of data collection and interpretation.

II. RESEARCH METHODOLOGY

The research methodology for present study has adopted questionnaire survey to identify significant factors influencing time & cost overruns in Indian high rise construction projects. To identify time & cost overrun reasons, literature reviews, books, conference proceedings and discussion with practitioners of all parties involved in construction industry were carried out. Primary survey Based on Interview type survey than on the basis of primary survey the secondary survey conducted and deeply analysis all valuable data.

Interviews were carried out with Project Managers, Sr. Engineers, and Planning Engineers of different stream department for each activity. For the Case study of high rise construction projects one to one conversation with the head of each organization firm of project is undertaken. The main purpose is to understand the major reasons for time & cost overrun in execution phase of high rise construction.

Questionnaire - Two different sets of questionnaire are prepared in order to provide the views and perspective of the end-users, who are already working in current high rise projects. The end-users are - Project Managers, Sr. Engineers, and Planning Engineers of different stream department.

The primary survey was separated into two noteworthy segments. The principal segment contains general data about the respondents such as, (1) Name of respondents; (2) Name of organization; and (3) Type of project (4) Location of work; (5) Designation; (6) Relevant experience in years. The second area related with Interview type questions which is related with Project information & valuable data for analysis. In this survey mainly focus on Project Details, Type of construction, Work Break down Structure of all construction Activity and any new construction techniques implement in Execution of construction. The secondary survey was separated into two noteworthy segments. The principal segment contains general data about the respondents such as, (1) Name of respondents; (2) Name of organization; and (3) Type of project (4) Location of work; (5) Designation; (6) Relevant experience in years. The second area related with time & cost overrun and their reasons which is related with each activity of high rise construction project. In this secondary survey mainly focus on time & cost overrun and their reasons in particular individual activity.

III. DATA COLLECTION AND ANALYSIS

Data for the project was collected from 5 identical construction sites and compared to understand major reasons for cost overrun and time over run. Basic data of constructions sites like organization name, project cost floors, height of building, method of construction etc.

Data collected from different sites are one by one analyzed and summarized to understand reason of cost over run and time over run.

Major reasons of time over run can be summarized as following chart:

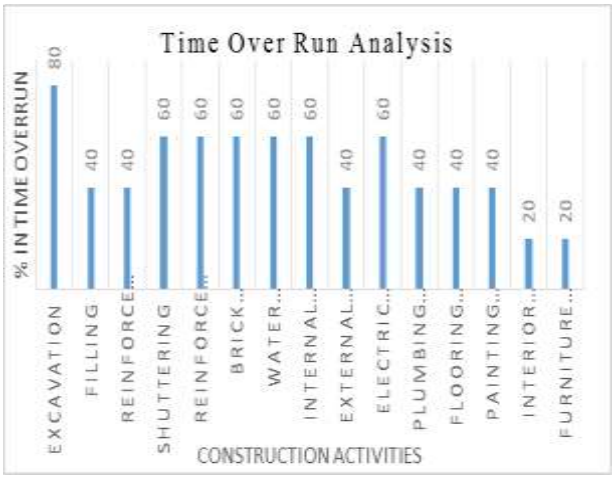

Fig. 1: Time overrun analysis

Major reasons of cost over run can be summarized as following chart:

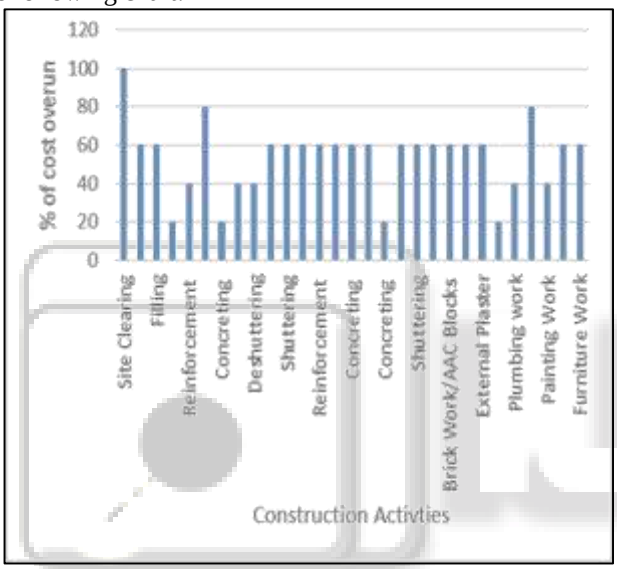

Fig. 2: Cost overrun analysis

IV. COST OVERRUN

There are so many advance construction techniques which can be more beneficial for the project in terms of cost. So it is a major task to find out the best suited Techniques & materials as alternative solution of cost overrun in high rise construction projects. Some studied Techniques & materials are as below

1) Coupler can be use on behalf of lap joints in 25mm and above diameter bars.
2) Fly ash Concreate can be use instead of conventional cement concrete
3) Aluminum formwork can be use instead of conventional formwork
4) Autoclaved aerated concrete (AAC) can be use instead of brick masonry.
5) Reuse Wastage material of Plaster in levelling work

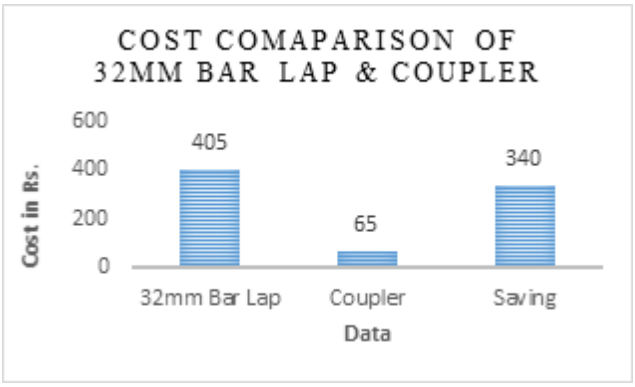

Fig. 3: Cost Comparison of 32mm bar lap & coupler

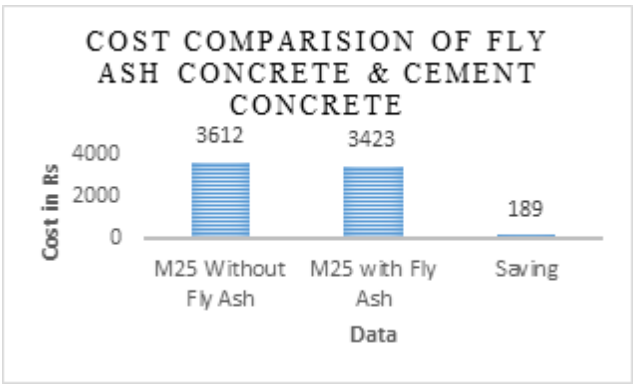

Fig. 4: cost comparison of Fly ash concrete & cement concrete

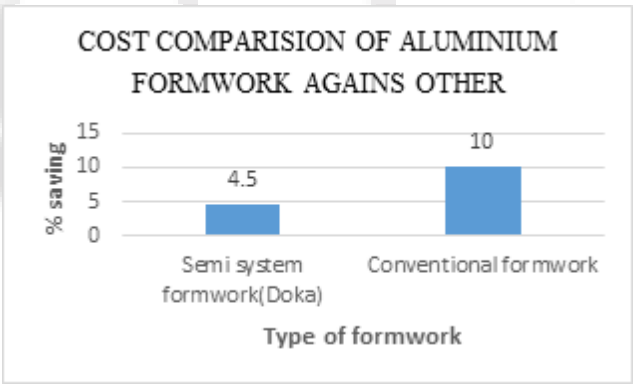

Fig. 5: Cost Comparison of Aluminum Formwork against Other

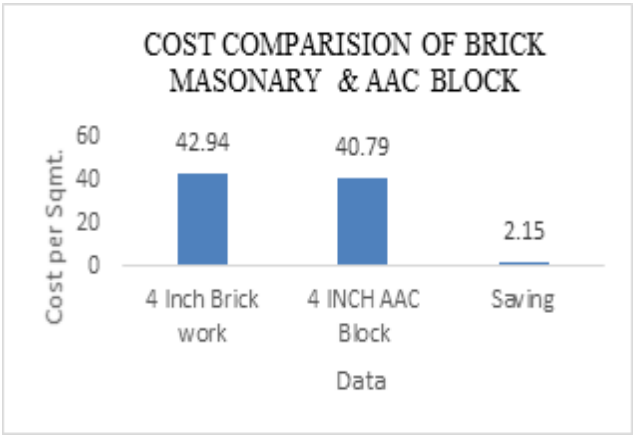

Fig. 6: Cost Comparison of Aluminum Formwork against Other

There is a wastage material produce due to some unskilled labor work & improper management in Plaster work. Due to wastage of material the cost overrun occur in

plaster activity and the only solution of this wastage is reuse wastage material in other levelling work.

V. TIME OVERRUN

There are so many advance construction techniques which can be more beneficial for the project in terms of time. So it is a major task to find out the best suited Techniques & materials as alternative solution of time overrun in high rise construction projects. Some studied Techniques & materials are as below

1) Precast technology can be use instead of cast in situ
2) Optimum use of labor techniques
3) Aluminum formwork can be use instead of non-repetitive conventional formwork
4) Autoclaved aerated concrete (AAC) can be use instead of brick masonry
5) Spraying method use in Plaster

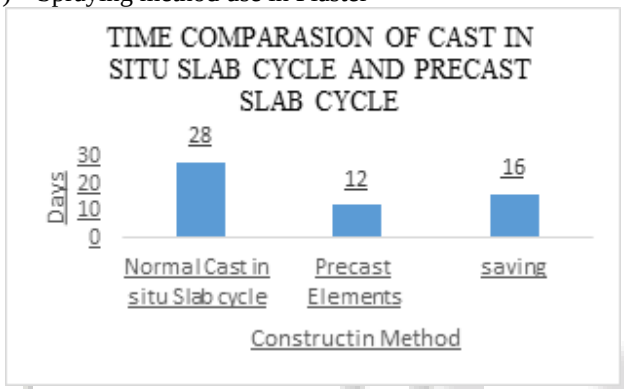

Fig. 7: Time Comparison of Cast in Situ Slab Cycle and Precast Slab Cycle

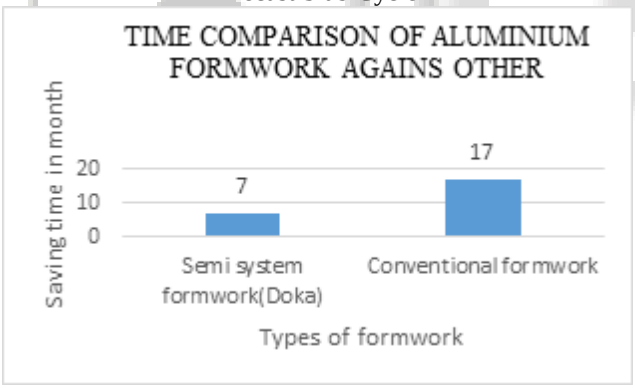

Fig. 8: Time Comparison of Aluminum Formwork against Other

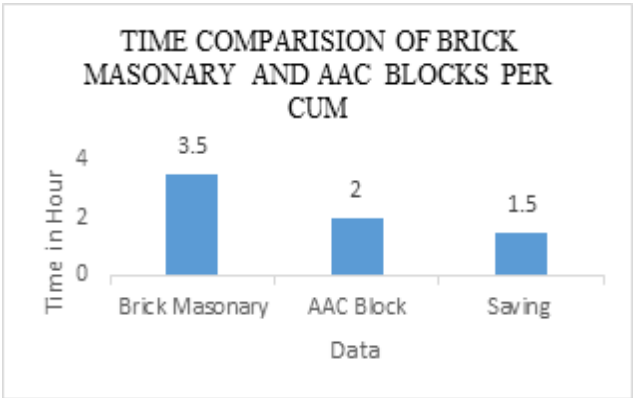

Fig. 9: Time Comparison of Brick Masonry and AAC Blocks Per Cum

Adoption of lean principle helps to overcome many basic problems at site. Use of lean principles helps to improve the productivity, to minimize the wastes, work balancing. By the use of lean principle, we can remove all non-value adding activities from the activity flow and we can redesign the activity map and can have maximum output. Implementation of lean principles helps to reduce the cycle time for one batch size of brick masonry reduce 52% of current state cycle time.

Plaster spraying allows a plasterer to skim a drywall more than five times faster than using a hand float to apply it. Although classic gypsum-based plaster can be sprayed if it is "spray grade," most plaster sprayers prefer the organic-based pre-mixed plaster packaged in a plastic bag because the plaster spraying machine does not need to be cleaned out after the job is finished, providing that plaster is kept moist. The pre-mixed plaster also has the advantage that any surplus can be recycled, almost eliminating waste, and plasterers do not need to haul water and mix the plaster from powder. A drywall skimmed with pre-mixed plaster can be painted in less than 24 hours, depending on the ambient temperature and humidity.

VI. CONCLUSION

The time & cost overrun and its control is extremely complex and vast subject for high rise construction projects in India. Most of the High rise construction projects are facing the problem, Many high rise construction projects are suffering because of use the typical conventional methods, techniques & materials which are consume more time & cost.

There are plenty of advance construction techniques and materials to control time and cost overrun in high rise construction projects. Even then, the use and implementation of better advance construction techniques and materials can improve the situation and can lead to achievement of more growth and development to the economy as a whole, since the quantum of planned investment per annum.

Industrial Engineering and management advance techniques such as Optimum use of labor techniques, material management techniques Lean construction technique etc, can help in reducing time duration of activities. Latest repetitive formwork, AAC blocks etc, can help in reducing cost of construction.

VII. RECOMMENDATIONS

There are plenty of advance construction techniques and materials to control time and cost overrun in high rise construction projects. The study is limited to a sample survey and interview for five high rise construction projects in Gujarat region which all are real-estate projects. The basis of the study here, recommended advance construction techniques and materials which are more beneficial over cost overrun and time overrun as below

1) Precast technology can be use instead of cast in situ which can be beneficial to control time overrun.
2) Optimum use of labor techniques which can be beneficial to control time overrun.
3) Aluminum formwork can be use instead of non-repetitive conventional formwork which can be beneficial to control time overrun & cost overrun.

4) Autoclaved aerated concrete (AAC) can be use instead of brick masonry which can be beneficial to control time overrun & cost overrun.
5) Spraying method use in Plaster which can be beneficial to control time overrun.
6) Coupler can be use on behalf of lap joints in 25mm and above diameter bars which can be beneficial to control cost overrun.
7) Fly ash Concreate can be use instead of conventional cement concrete which can be beneficial to control cost overrun.
8) Reuse Wastage material of Plaster in levelling work which can be beneficial to control cost overrun.

REFERENCES

[1] Singh, R. 2009 Cost and time overrun in Infrastructure Projects, Department of Economics, and Delhi School of Economics.
[2] Sadi, A.A., Sadiq A.H. 2005, Causes of delay in large construction projects, International Journal of Project Management 24 (2006) 349–357, Construction Engineering and Management Department, King Fahd University of Petroleum and Minerals, Box # 680, Dhahran 31261, Saudi Arabia
[3] https://www.academia.edu/7829045/dissertation_on_highrise_buildidngs(dissertation_on_highrise_buildidngs)
[4] http://theijes.com/papers/v3-i4/Version-2/B03402012020.pdf (B03402012020)
[5] http://rspublication.com/ijeted/march13/6.pdf (high rise buildings in India)
[6] http://global.ctbuh.org/resources/papers/download/902-high-rise-sky-towers-mumbai-construction-challenges.pdf (902-high-rise-sky-towers-mumbai-construction-challenges)
[7] https://www.researchgate.net/publication/235989436_Construction_Techniques_And_Demand_Of_High_Rise_Building_In_India
[8] http://www.skyscrapercity.com/showthread.php?t=1654476 (All High rise buildings in Ahmedabad)
[9] https://en.wikipedia.org/wiki/List_of_tallest_buildings_in_India#Tallest_under_construction (List of All Tallest Building)
[10] http://www.ijera.com/papers/Vol4_issue4/Version%201/BI044369376.pdf (Steel & RCC Composite Structure)
[11] http://samples.sainsburysebooks.co.uk/9781405168397_sample_383563.pdf(Steel & RCC Composite Structure

