Study on Comparison Between Prefabricated And Conventional Structures

Suraj kanase[1], Gajanan Gaikwad[2], Pravin Bhalerao[3], Shreyas Ladage[4]

[1, 2, 3, 4] Dept of Civil Engineering

[1, 2, 3, 4] Alard college of engineering and management, pune

Abstract- *The growth of Indian construction is going to become a fast to fulfill the need of future generation, time effective and achieving advance technique. The paper based on time comparison of precast concrete vs. cast-in-place (i.e. traditional) concrete. How total time of construction by precast concrete system is less than the time by use of cast-in-place concrete. Time of any construction is directly varied with cost of construction. The time required for steel binding, shuttering, concreting then time required for curing will be minimize (7 days).The Precast is manufactured in factory (i.e. in controlled environment) with required quality, easily mix, and cure till achieved good quantity with desired strength. Precast concrete is manufactured in factory and transport to site.*

Keywords*- precast concrete, convention, cost & time analysis*

I. INTRODUCTION

Precast concrete is a construction product produced by casting concrete in a reusable mould or "form" which is then cured in a controlled environment, transported to the construction site and lifted into place ("tilt up").

In contrast, standard concrete is poured into site-specific forms and cured on site. Precast stone is distinguished from precast concrete using a fine aggregate in the mixture, so the final product approaches the appearance of naturally occurring rock or stone.

reported were better supervision, frozen design at an early stage, reduced construction costs and shortened construction time. On the other hand the major disadvantages were inflexibility for design changes, lack of research information and higher initial construction costs. (Tam et al., 2006)

1.2 PROBLEM STATEMENT

- Cost Analysis of Prefabrication and conventional.
- Analysis of comparision between conventional and prefabrication.

1.3 OBJECTIVES

- To compare the cost and time of precast construction vs conventional construction.
- To analyze the data in order to determine the reasons for cost discrepancies between the prefabricated and conventional building industri.

1.4 SCOPE OF THE PROJECT

The scope of this study is to compare the conventional construction and precast construction and the results arrived based on the cost and duration of the project.

- Construction can be done effectively so that the overall construction cost could be saved.
- The time duration of the project can be minimized in precast construction.
- Generally resources wastage is common in construction. The effective construction process reduces the wastage of resources in large amount

II. LITERATURE REVIEW

Isabelina Nahmens et al [1] investigated on UK housing market and their usage of prefabrication. Investigation of past experiences and existing knowledge of prefabrication has allowed several low cost techniques to be summarized. These minimize the initial investment and increase the market value of UK house constructions.

Yingchen et al [2] suggested to choose prefabrication is highly based on experience and familiarity and personal preference rather than rigorous data. Methodical assessment of an appropriate construction method for a concrete project has been found deficient. This paper showcases a tool called construction method selection model. It helps to detect and evaluate the feasibility of a project in prefabrication at early stages.

Krish.RVillaitramani andDhruv.PHirani [3] reported on deals with the slum clearance in Mumbai city. Benefits,

Limitations and case study of mass housing by prefabrication method is successfully done. A review has been carried out in this paper to plan, analyze and design residential building using prefabricated techniques in Mumbai, bearing in mind, the cost of total construction and planning of the building are done in such a way that the maximum area utilization is achieved for minimum space and cost

N. Dineshkumar and P. Kathirvel [4] investigated on the present situation of precast in India. Suggestion for improvement and study of cost effectiveness for single and multi storey building. Literature survey was done between prefabricated and conventional structure. A detailed investigation on both types of construction was done.

OmidReza and Baghchesaraei [5] interprets that prefabrication systems might have some potential of increased use in future because of their characteristics. This paper clearly deals

V. Karthikeyan, E Vinodhini, P. Aparna, T. Monika, R. Sathish Kumar http://www.iaeme.com/IJCIET/index.asp 3 editor@iaeme.com

III. METHODOLOGY

- Plan Preparation
- Data Collection
- Estimation of Quantities
- Cost Analysis
- Discussion
- Conclusion

PLAN PREPARATION

To estimate the quantities of conventional and prefabricated constructions.

DATA COLLECTION

In the data collection we can also know the procedures of the construction work and also find out the difficulties of the work. This collection is helpful to find out cost of the project for the both constructions. We also find the project duration of the construction by using these enquiries.

ESTIMATION OF QUANTITIES

Estimation is used to find out the requirement of the materials for both the constructions. The details of the materials which are used in the construction from the

companies were collected. By getting these details we can estimate the quantities of the materials

CASE STUDY

Name Of Project: Maharashtra state police housing and welfare corp.ltd.
Total plot area: 25863.00SQ.M.
Total built-up area (Permissible): 19396.95SQ.M
No. of flats: 132
Total project cost: 18.3Cr
Site location: F.P.NO.:Karad: 394
Address: Karve road, Tal-Karad, Dist- Satara.

COLUMN

Precast method

Precast column for M25 Grade

- Column Size = 0.35x0.35x2.820 M
- Total volume = 0.35 m3
- Steel required = 46 kg

- R.M.C rate for 1m3 concrete =5531 Rs.
- for 0.35 m3 concrete cost =(5531*0.3)=1936 Rs
- Labour cost for 1 column =125 Rs.
- Erection cost for 1 column =46 Rs

Total cost required for 1 column
Concrete=1936 Rs
Steel cost=46*53.9(Rate/KG)= 2479 Rs
Labour cost =125 Rs
Erection cost =46 Rs
Total column cost= 4586Rs

- Total no of column required for 1 floor 36 No's
- Total cost =4586*36 =165096 Rs
- 1m3 Rate for column =13103 Rs

Conventional Method

- Column Size = 0.35x0.35x2.820 M
- Total volume =0.35 m3
- Steel required=46 kg
- Conventional rate for 1m3 concrete= 8188 Rs.
- For 0.35 m3 concrete cost=8188*0.35 =2866 Rs

Total cost required for 1 column

- Concrete=2866 Rs
- Steel cost =46*53.9=2479 Rs

☐ Total column cost=2866+2479=5345 Rs
☐ Total no of column required for 1 floor 36 No's
☐ Total cost =5345*36 =192420 Rs
☐ 1m3 Rate for column =15271 Rs

BEAM

Precast method

☐ Precast Beam for M25 Grade
☐ Total volume of Beam =14.202 m3
☐ Steel required 2011.18 kg
☐ R.M.C rate for 1m3 concrete =5531 Rs.
☐ For 14.202 m3 concrete cost 78551Rs
☐ Labour cost for 57 beam = 42x57 =2394 Rs.
☐ Erection cost for 1 beam =22 Rs.
☐ Total 57 no's of Beam = 22x 57= 1254 Rs.
☐ Total cost required for 57 no's of beam
☐ Concrete=78551Rs
☐ Steel cost =108403Rs
☐ Labour cost=2394 Rs
☐ Erection cost=1254 Rs
☐ Total beam cost =190602 Rs
☐ 1m3Rate for Beam =13421Rs

Conventional Method

☐ Total volume of Beam =14.202 m3
☐ Steel required = 2011.18 kg
☐ Conventional rate for 1m3 concrete 8237 Rs.
☐ For 14.202 m3 concrete cost =116982 Rs
☐ Total cost required for 57 no's of Beam
☐ Concrete=14.202*8237=116982 Rs
☐ Steel cost =2011.18*53.9=108403Rs
☐ Beam cost =225385 Rs
☐ 1m3 Rate for Beam =15870 Rs

LINTELS

Precast method

☐ Total volume of lintels =0.94 m3
☐ Steel required =72.16 kg
☐ R.M.C rate for 1m3 concrete =5531 Rs.
☐ For 0.94 m3 concrete cost =5199 Rs
☐ Labour cost =125 Rs.
☐ Erection cost for 1 lintel =40 Rs.
☐ Total 48 no's of lintels = 48x40 =1920 Rs.
☐ Total cost required for 48 no's of lintel
☐ Concrete=5199 Rs.
☐ Steel cost =3889Rs.
☐ Labour cost =125 Rs.

☐ Erection cost =1920 Rs.
☐ Total lintels cost =11133 Rs.
☐ 1m3 Rate for lintels=11844Rs.

Conventional Method

☐ Total volume of lintels =0.94 m3
☐ Steel required =72.16 kg
☐ Conventional rate for 1m3 concrete 8237 Rs
☐ For 0.94 m3 concrete cost =7743Rs.
☐ Total cost required for 48 no's of lintels
☐ Concrete=7743Rs.
☐ Steel cost =3889Rs.
☐ Total lintels cost =11632 Rs.
☐ 1m3 Rate for lintels=12374 R

SLAB

Precast method

Siporex slab Panels
Total no of Siporex slab panels required for per floor 92 No's
Cost given in per panel

☐☐Total cost Required for 92 panels =200640 Rs
☐ Erection cost for 1 panel =15 Rs.
☐ Total 92 no's of panels = 15x92 =1380 Rs.
☐ Total cost required for 92 no's of panels
☐ Cost for slab panels=200640
☐ Erection cost =1380 Rs
☐ Total slab panel cost =202020 Rs
☐ Screeding of 40 mm
☐ Total volume of screeding =8.32 m3
☐ For 1 m3 m 25 grade rate of concrete=5531 Rs
☐ Steel required =630 kg
☐ Total Screeding cost
☐ Concrete cost=8.32*5531=46018 Rs.

☐☐Steel cost=630*53.9=33957 Rs
☐ Total cost=46018+33957 =79975 Rs
☐ Total cost for slab =281995 Rs

Conventional Method

☐ Total volume of Slab =23.44 m3
☐ Steel required =2760 kg
☐ Conventional rate for 1m3 concrete =8843Rs.For 23.44 m3
☐ concrete cost =23.44*8843=207280 Rs
☐ Total cost required for Slab
☐ Concrete=207280Rs
☐ cost =148764Rs
☐ Total Slab cost =356044 Rs

LINTEL WITH CHAJJA

Precast method

- Total volume of lintels=0.78 m3
- Steel required =188.19 kg
- R.M.C rate for 1m3 concrete =5531 Rs.
- For 0.78 m3 concrete cost =4314 Rs
- Labour cost =125 Rs.
- Erection cost for 1 lintel with chajja=75 Rs.
- Total 28 no's of lintels with chajja = 2100 Rs.
- Total cost required for 28 no's of lintels with chajja
- Concrete=0.78*5531=4314Rs
- Steel cost=188.19*53.9=10143Rs
- Labour cost =125 Rs
- Erection cost=2100 Rs
- Total lintel with chajja cost =16682 Rs

- 1m3 Rate for lintel with chajja 21387Rs

Conventional Method

- Total volume of lintel with chajja =0.78 m3
- Steel required =188.19 kg
- Conventional rate for 1m3 concrete =9196Rs.
- For 0.78 m3 concrete cost =7173Rs
- Total cost required for 28 no's of lintel with chajja
- Concrete=0.78*9196=7173 Rs
- Steel cost =188.19*53.9=10143Rs
- Total lintels cost =17316 Rs o 1m3
- Rate for lintels 22200 Rs

STAIR CASE

Precast method

- Total volume of staircase = 0.48 m3
- Steel required = 36 kg
- R.M.C rate for 1m3 concrete =5531 Rs.
- For 0.48 m3 concrete cost =2655 Rs
- Labour cost =125 Rs.
- Erection cost for 1 staircase =250 Rs.
- Total 4 no's of staircase = 4x250 =1000 Rs
- Total cost required for staircase
- Concrete=0.48*5531=2655 Rs
- Steel cost =36*53.9=1940 Rs
- Labour cost =125 Rs
- Erection cost =250 Rs
- Total staircase cost =4970 Rs
- Total no of Staircase required for 1 floor 4 No's
- Total cost =4970*4 =19880 Rs

- 1m3 Rate for lintels 10354Rs

Conventional Method

- Total volume of Stair case =0.48 m3
- Steel required =36 kg
- Conventional rate for 1m3 concrete =9196Rs.
- For 0.48 m3 concrete cost =4414 Rs
- Total cost required for stair case
- Concrete=0.48*9196=4414 Rs
- Steel cost =36*53.9=1940Rs
- Total staircase cost=4414+1940=5354Rs
- 1m3 Rate for lintels 13238Rs
- Total no of Staircase required for 1 floor 4 No's
- Total cost =5354*4 =21416 Rs
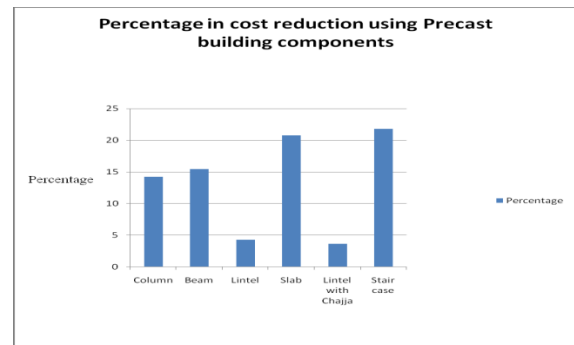
This graph shows that the components wise cost comparison in percentage. Column reduces 14.2%, Beam 15.433%, lintel 4.29%, Slab 20.8%, lintels with Chajja 3.66% and Staircase 21.78%.
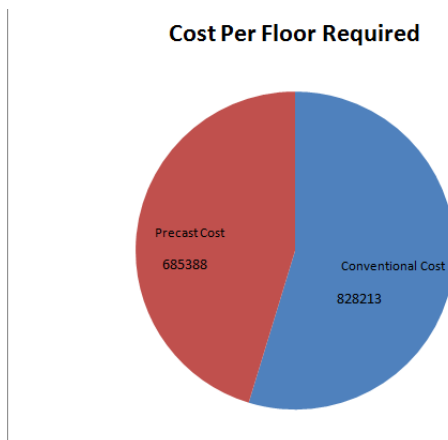
This pie chart shows cost between conventional and precast construction.
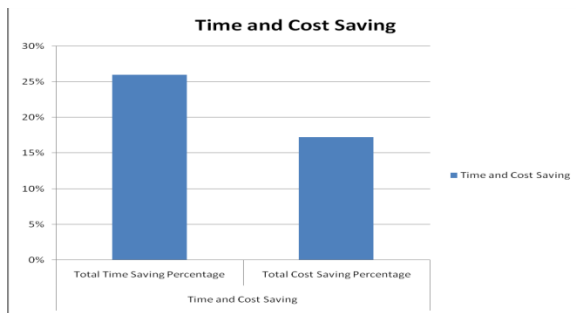
The above graph shows that the combination of cost saves per floor and time saving. From that the total time saving is 26% and the average components cost saving is 17.24%.

IV. CONCLUION

- Utilizing the precast building components we reduce the cost up to 17.24 %, using the methodology we can reduce the project duration up to 26 %. Construction of various elements by use of precast methodology helps us to achieve economy and fast track construction which is need of construction industries.

- It is found that the time required in case precast construction is quite less as compared to conventional. Quality obtained in precast construction is better as compared to in-situ construction.

REFRANCES

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