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Study on Comparison of Precast and Cast In-Situ Construction of the Structure based on Economic Category

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Abstract - *India has been trying to transform from an agricultural society to an industrial society. For decades, India has invested a lot of money in education to develop its people in fields that would make its transition to an industrial nation much easier. As a result, labour costs have risen exponentially. Like other Asian countries, India is now facing a rising labour cost and a lack of both skilled and un-skilled workers. Many developers and contractors in India also see this problem and respond by using more prefabrication; this attracts many investors from all over the world to invest more in the prefabricated construction business. Currently, there are several residential developers in India that use prefabrication for their projects. In the near future, prefabrication is expected to play a major role in India construction, especially, in the residential construction like in many European countries and the United States.*

In order to compare Cost and Time relationship exists between Precast and Cast in-situ construction, G+2 storey building is considered

***Key Words*: Prefab, cast in-situ construction, comparison**.

1.INTRODUCTION

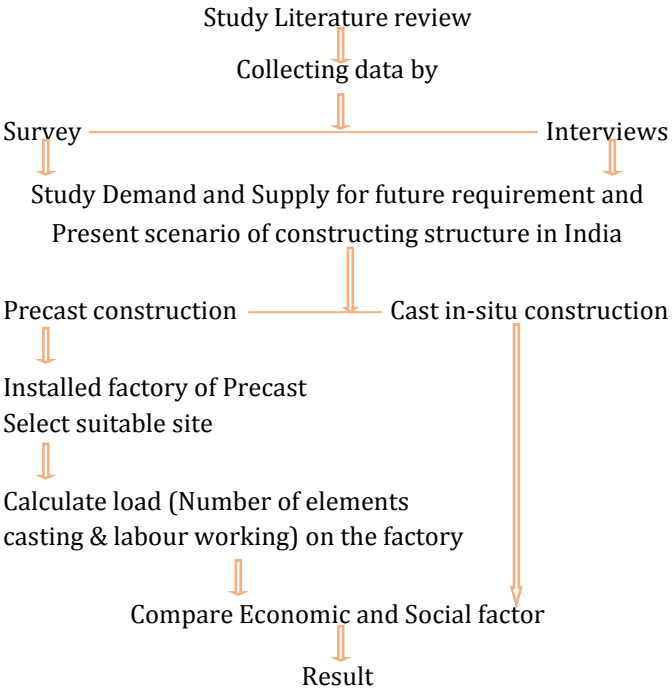
Prefabrication plays an important role in the modern world construction of every building today, it refers to the making of parts in an offsite workshop or factory prior to the installation at the site. "The primary purpose of prefabrication is to produce building components in an efficient work environment with accesses to specialized skills and equipment in order to reduce overall cost and time expenditures on the site while enhancing quality and consistency". Most new construction will have to use more and more prefabrication. From primary structures to small architectural ornaments, prefabrication has become a major part of building construction.

Although prefabrication is a common method of construction in the U.S. and in many European countries, several countries in Asia are still not familiar with this method. Because those Asian countries have different social and economic systems from the U.S., they tend to use more actual manpower for constructions rather than prefabrication methods. Construction methods that require a lot of physical labour such as masonry, hand paint or cast-in-place concrete are common in India. Because India is an agricultural society, the labour wage for agricultural work in India is much lower than the labour wage for industrial work in the United States. Furthermore, unlike the United States, a lot of countries in Asia including India may have fewer concerns in many important aspects of building construction, such as preciseness, on-site safety, energy saving and waste management during a construction. All these issues can be resolved by prefabrication methods.

1.1NEED OF STUDY

Urbanization is the rapid influx of people migrating to cities. The UN has predicted that by 2050, 64.1% and 85.9% of the developing and developed world respectively will be urbanized. With limited resources of labour, time and finance, slums around the world continue to grow in uninhabitable conditions for humans. Rapid urbanization and availability of jobs in attracts thousands of people around the nation seeking work opportunities. Perhaps, a dearth of residential houses and rising prices has forced millions to live in slums in uninhabitable conditions. Which lead to the shortages of the mass housing. In India rising urbanization has created an imminent urban housing shortage of around 18.78 million houses. The shortage is more prominent in the Economically Weaker Section (EWS) / Lower Income Group (LIG) / Middle Income Group (MIG), which comprises of 95.62% of the housing shortage. Quite aptly, urban planners, real estate players and the government have all been eyeing at the development of the mass or affordable housing projects to cater to the needs of the lower- or middle-income households.

2. METHODOLOGY



3. PLAN PREPARATION

Plan preparation is done for the G+2 building to estimate the quantities of conventional and precast constructions. The plan of the building is shown in fig.1

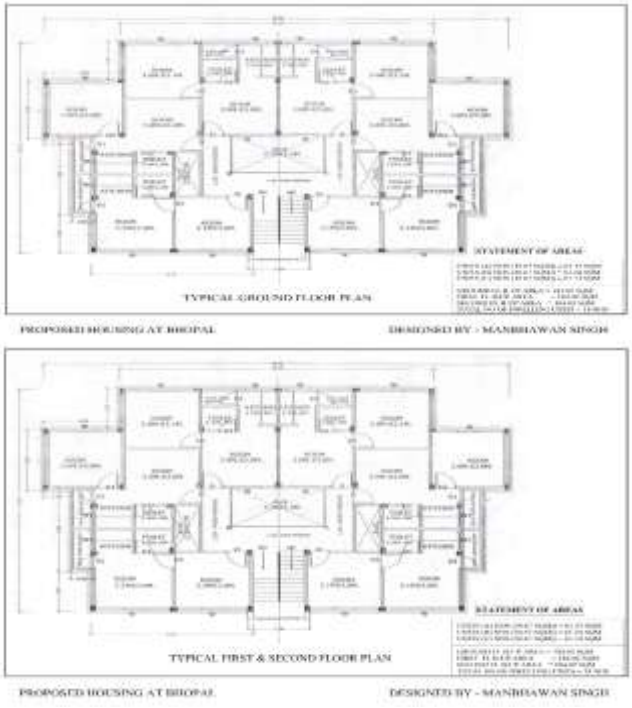


Fig-1 Typical plan of Ground, first and second floor

Table -1: Plan Details

STRUCTURE	G+2
One Block Area	184.02 Sqm.
Number of Block	89
Number of Units in one Block	18
Number of dwelling units proposed	1602 Nos.

4. 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.

Table -2: Details of area used in Constructions

S No	Description	Area	Unit	Percentage
1	Total Land Area	45000	Sqm.	
2	Total block area	16378	Sqm.	36.40
3	Area of Roads	11622	Sqm.	25.83
4	Amenities	17000	Sqm.	37.78
5	Total			100

4.1Cost Analysis

This is the main factor which is considered in the project is to find out the comparison of cost analysis of building for the prefab construction and conventional construction. In this analysis we want to consider the resources of labour, material and machineries.

Table-3: Cost Analysis Cast in-situ Construction G+2 storey

Activity	Cost in rupees
A) Foundation and plinth Beam	459317
B) Ground Floor	1211635
C) First Floor	1177846
D) Second Floor	1177846
Subtotal	4026644

Cost of the one block in-situ structure is Forty lac twenty-six thousand six hundred forty-four (4026644)

Hence Cost of the one unit Two lacs twenty-four thousand (224000)

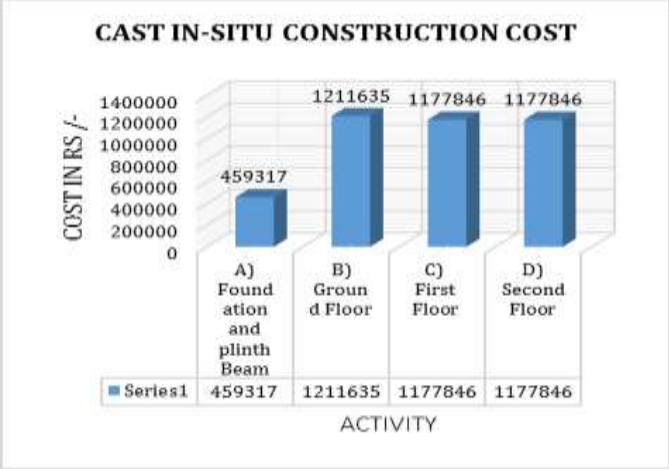


Fig-2 Cast in-situ construction Cost

Table-4: Cost Analysis of Precast wall bearing Construction

Activity	Cost in rupees
A) Foundation and plinth Beam	459317
B) Ground Floor	1383051
C) First Floor	1351934
D) Second Floor	1351934
Subtotal	4546236

Cost of the one block in precast structure – Forty-five lacs forty-six thousand two hundred thirty-six (4546236)

Hence cost of one unit Two lacs fifty-three thousand (253000)

Fig-3 Precast wall bearing construction Cost

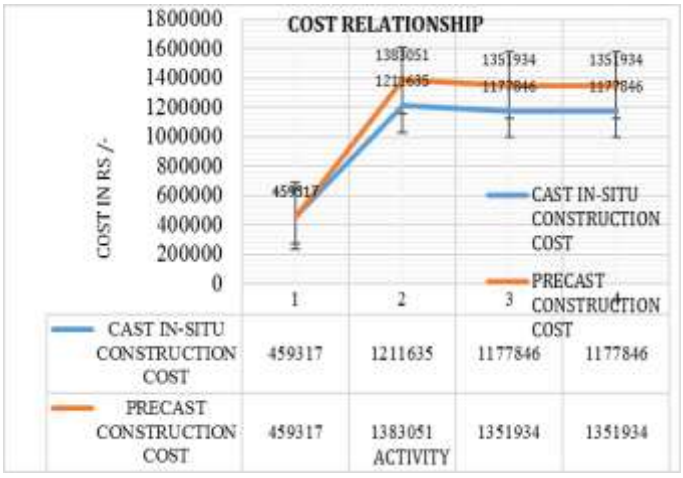


Fig-4 Relationship between Cast in-situ and Precast construction Cost

4.2 PROJECT DURATION

Project duration of each construction was collected from the site offices and compares the time of completion of gives the project duration of precast and conventional construction of the building.

G+2 CAST IN-SITU RCC FRAMED STRUCTURE- the Time period of the one block having 18 units given below

Table-5: Time Analysis of Cast in-situ Construction

Activity	Day	Total days
A) Foundation and plinth Beam	30	30
B) Ground Floor	20	50
C) First Floor	20	70
D) Second Floor	20	90
Subtotal	90	

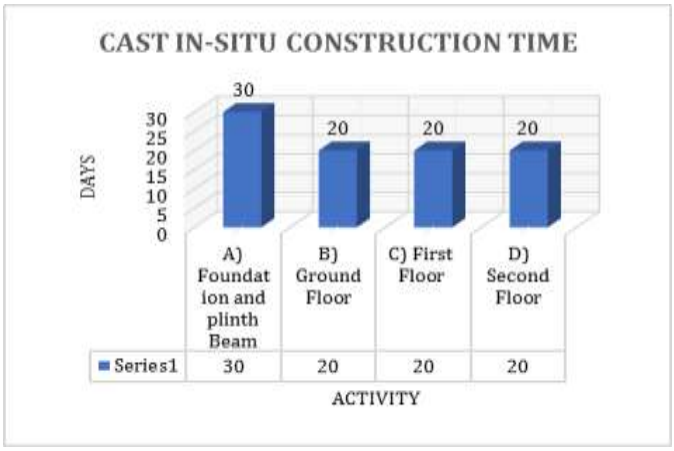


Fig-5 Cast in-situ construction time

Table-6: Time Analysis of Precast Construction

Activity	Day	Total days
A) Foundation and plinth Beam	30	30
B) Ground Floor	7	37
C) First Floor	7	44
D) Second Floor	7	51
Sub total	51	

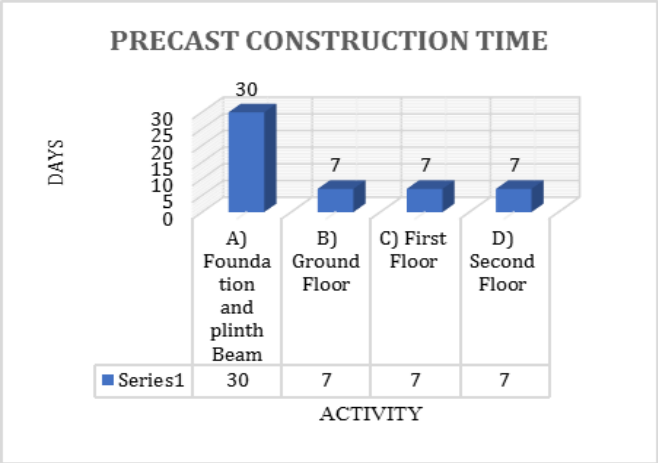


Fig-6 Precast wall bearing construction Time

Fig-7 Relationship between Cast in-situ and Precast construction Time

4.3 REPAIRING WORK

Repairing work of each construction was collected from the housing and compares the repairing work for gives the project of the precast and conventional construction of the building.

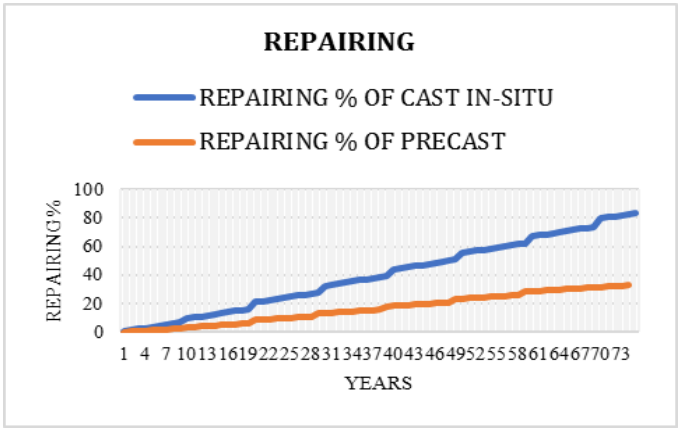


Fig-8 Relationship between Cast in-situ and Precast construction of repair work

5. CONCLUSIONS

We have study and analyzed the both methods cast in-situ construction and precast construction. The initial cost of precast construction is more than Cast in-situ construction because in India cost of precast labour (skilled) is more than normal labour. And lack of knowledge about the precast construction.

The cost of maintenance (repair cost) is more in cast in-situ construction as compare to precast construction. But after 15-20-year precast construction is economical. And Time saving in precast construction is 40-50% of the Cast in-situ construction. At the end value of cast in-situ construction is 2% but at the end value of precast construction is 50% because it can be easily recyclable.

More significant advantages, such as improved quality control, reduction of construction time, construction waste, dust and noise on-site, and less labour requirement on-site.

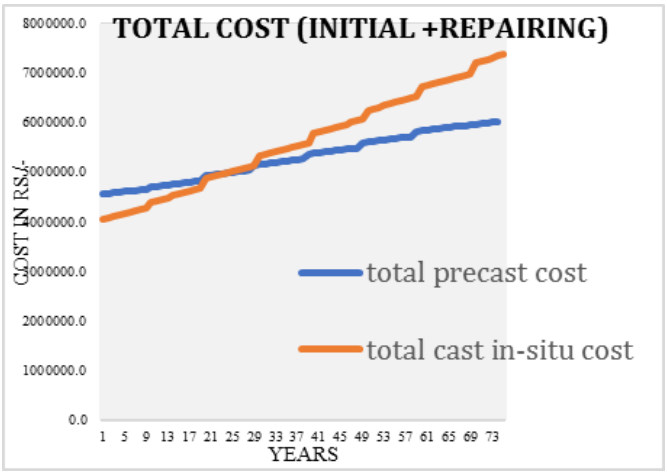


Fig-9 Relationship between Cast in-situ and Precast construction of the Total Cost

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BIOGRAPHIES

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