

Comparative analysis of Mivan Formwork and Precast Method of Construction in Residential building of Noida Region

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Abstract: *This Paper gives a comparative overview of Mivan Formwork and Precast method of construction in residential buildings. This helps in identifying the main aspects of both methods and possible reasons for affecting the selection of any method. These new technologies are analysed on various parameters like cost, time, labour etc.*

Keywords- *Mivan formwork, Precast Method, Cost-effectiveness, End Product and Residential buildings*

I. INTRODUCTION

There are many studies showing a shortage of houses in India and mainly in U.P. As a neighbouring part of Delhi, Noida has more possibilities for developing these required houses at a high-speed rate. As it is known that India is a developing country where the adoption of technology is changing day by day, the same is also true for the construction industry [1-3]. Thus it is necessary also for a change of technology in the construction industry from the old traditional conventional formwork system, which is very time and labour consuming style of work [4].

There are two most commonly adopted formwork systems over the conventional method, viz., Mivan Formwork and Precast Method. The two advanced technologies came to the Noida region only in the past few years and are growing day by day.

Mivan Formwork was developed in Malaysia and adopted in India rapidly in past few years. It is widely adopted by the builders in Noida region because the end product from the conventional system is not up to mark and customers are unsatisfied as the building starts needing maintenance work within one or two years [5-7]. Apart from this, Mivan has many benefits in terms of Cost, Time and Quality of Project. In this formwork system Column, Wall and Slab concreting is done in one go and is also called as “Monolithic Casting”. This same formwork can be re-used for around 250 repetitions which makes it cost saving formwork.

Precast method, on the other hand, is also an alternative to both Mivan and Conventional but not popular for residential construction, until now in Noida. Both Mivan and conventional methods are labour dependent and intensive and may cause a delay in a project. This can be avoided using Precast as it is more machine dependent. In this method, structural elements like shear walls and hollow core slabs are cast in a factory under the supervision of skilled persons [8]. After achieving required strength they are transported to the site and erection of panels are done using tower crane and minimum manpower is required to complete the job [9-10].

The use of Precast in the residential sector is very low in the Noida region compared to Mivan. It has great potential especially as per current needs.

An attempt has been made in the current paper to compare the two methods for a residential building construction on the basis of cost, time, manpower usage and end product result, customer satisfaction and limitations.

I. METHODOLOGY

The methodology adopted here is the collection of data from the site through visits and getting the questionnaire filled, discussion with the managers and workers at the site, literature review and existing case studies. Also, some customer satisfaction data were collected from the end-users. The data was mainly collected with respect to individual builders and not as per different sites of the same builders because there is a very little variation in the process and other factors. One site of pre-cast has been considered, due to non-availability of the site there are several upcoming projects whose data is not available for analysis, till the time of the study. In the case of Mivan formwork, there are many builders who are working on the technology, but only one has been considered, due to very little variation in rates, for analysis purposes.

II. OBJECTIVES

The main objectives of the study were to compare the Mivan formwork and pre-cast method on the basis of,

1. Cost Effectiveness
2. Time
3. Manpower Usage
4. End Product Result and Satisfaction
5. Limitations

Data was collected from one residential tower of each of the buildings and the collected data has been tabulated in the below tables, Mainly For Precast Supertech Golf Village and in Mivan avg. data sheet prepared from the projects of builders like Gaur City project Yamuna Expressway, Migsun Wynn Project and Mahagan Manorial.

Cost Effectiveness

TABLE 1: Cost comparison of Pre-Cast construction and Mivan formwork

S.no	Description	Precast	Mivan
1	Building Types	Residential	Residential
2	Floor	B+2P+20	B+P+25
3	Total Construction Area (SqFt)	185263.5	238625
4	Total Construction Cost (Rs)	17.69 Cr	18.86 Cr
5	Per SqFt Cost	955 Rs/Sqft	790 Rs/Sqft

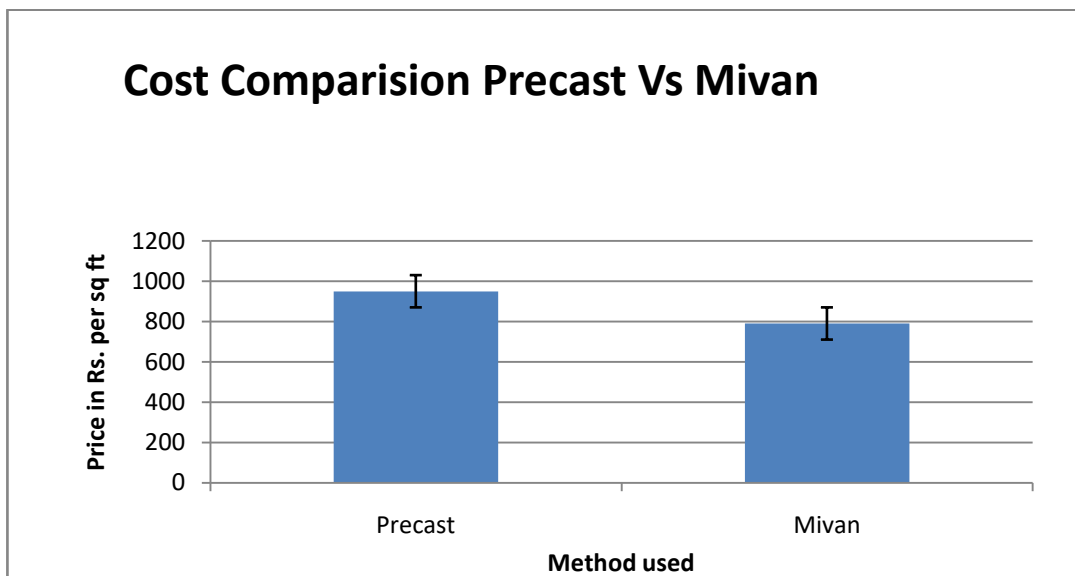


Fig. 1 Graph showing per sqft structure cost difference between Mivan and Precast.

Time

TABLE 2: Time taken to complete the work

S.no	Description	Precast	Mivan
1	Floor Cycle above Cast-In Situ	7 days per Floor	12 days per Floor

This table is shown for one-floor construction, Precast take avg. 7 days whereas mivan takes avg 12 days. For 20 storey building make a difference of 100 days or 3 months.

Manpower Usage

TABLE 3: Manpower required for both type of work

S.no	Description	Precast	Mivan
1	Skilled (nos)	04	21
2	Unskilled (nos)	04	25

This table helps in understanding the usage of the type of manpower required to complete a task. This shows that in Precast mainly skilled manpower used and also numbers are less overall as compared to Mivan. So Precast is less manpower dependent than Mivan. This data is to complete a one-floor cycle Per day activity.

End Product Result and Satisfaction

A satisfaction survey was conducted with many home buyers, some of whom were already residing in the houses constructed using Mivan form.

However, due to lack of delivered project of Precast in high rise residential society, especially in the Noida region, the authors were not able to get any data but while discussion, it came to that they are aware of technology and seem interested.

Due to a good finish and more strength, buyers are now moving from conventional formwork to these two types of technology as they are produced less wastage and fast delivery with good strength.

After talking to many buyers one question was raised by the buyers about precast that will it sustain during an earthquake, as it is not monolithic construction but panels are brought from manufacturing and assembled at site. How long this assembling of panel stays and how much safer it is to live in a house made-up of precast elements? Since there are very few projects being constructed using this technology, and lack of knowledge and awareness about the technology, raises a question in the buyer's mind but it plays a very small role and after discussion with the project team, the doubts are cleared. However, low maintenance cost as compared to the conventional form of construction is one of the benefits, which end-users are looking at.

III. RESULT AND DISCUSSIONS

From the analysis of collected data, it has been observed that the construction cost of Precast is higher as compared to Mivan formwork. When the quality, speed and durability of the structure is almost the same for both the methods, the only cost makes the difference for selection of which type of method is to be adopted for construction.

Then Mivan is to be adopted and it is used more commonly due to cost factor as per the results of current regions and situations.

The Precast technology can be boosted up if manufacturing units are set up near or inside the project site, which results in the cost reduction in the transportation of panels. Also if rates are revised and make it reasonable then construction cost of precast will be reduced and might be the same as Mivan. If it is done then precast is much better than Mivan because of high accuracy, speed and less manpower dependent.

Precast is also sustainable because it creates less noise pollution, minimum waste generation and less water requirement as compared to Mivan formwork.

Limitations

Mivan Limitations

1. The Aluminium formwork is expensive and can only be cost-effective if used for symmetrical structures.
2. Difficult in modification to existing structure due to RCC Walls and cost escalates, if changes are requested.
3. Since the size of the wall is small, it is difficult to work for laying the electrical and plumbing conduiting.
4. May not be used for small projects which have fewer floors, as it would increase the cost.

Precast Limitations

1. Most of the work is machine dependent which increases the cost.
2. Materials are transported from the factory to site cause damages to corners and panels.
3. Transportation cost is high
4. Panels are heavy weighted.
5. The higher cost is incurred in factory installation.

IV. CONCLUSION

From the results, it is concluded that till now in this region for residential building construction Mivan is suitable for adoption.

Also, Mivan is widely adopted by many builders which signifies its importance and value for money product. Due to less construction cost, maintenance cost and speedy work it put ahead of Precast method at this stage.

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