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Comparison of conventional building and mivan formwork building based on scheduling

M.Sandeep¹, S.Suriya Prakash², M.Vetrivel³, R.Ranjani., M.E.,

^{1, 2, 3} UG Students, Department of Civil Engineering, Nandha Engineering College, Erode
⁴Assistant professor, Department of Civil Engineering, Nandha Engineering College, Erode

Abstract- Construction industry is having biggest role in economy of India. In recent times, the global economy and growth of population in India, land acquisition has become more difficult. To fulfill the need of shelter of this growing population and increasing industrialization, speedy construction is the necessity of time. Same time, due to inadequacy of land Vertical growth is preferable than Horizontal one. Formwork plays an important role in construction buildings. It constitutes 20% cost and 60% time of the total construction. This project does the comparison of the Conventional Formwork and Aluminum Formwork systems.

KeyWords- Conventional Formwork, Construction Cost, Mivan Formwork, Time.

I.INTRODUCTION

Formwork is a temporary structure which supports fresh concrete till it becomes strong enough to sustain its own weight. After setting of concrete, the formwork is removed and a solid structure of required shape and size is produced. This is the very important element in the construction of building. For many years, in the field of construction; use of conventional i.e. wooden formwork was a regular practice. Now the scenario of construction field is much different, but the study is needed in order to choose the suitable Formwork with different perspectives. Cost, times are the basic parameters but along with that we should also focus on quality, safety and construction waste generation during the process. Currently in India other types of Formworks are also available

II. DATA COLLECTION

Now days, low waste formwork systems for construction are being used. The large sized columns in buildings are now being replaced by small thickness shear/RCC Walls. So it gives a large carpet area and removal of offsets in the building. Also the quality of construction is getting upgraded. At the present time, many formwork solutions are available in the market, but the study has to be done in order to choose the best formwork for any particular type of building. . Completion of project .This will save the time and ultimately money

A. Basic types of formwork

1. Conventional Formwork

2. Mivan Formwork

As the name system it gives the idea that it must be well organized and time saving also.

The quality of conventional formwork degrades as the repetition increases and also it needs proper maintenance in order to get more repetitions. So to avoid this, the comparison between different types of Formwork is needed in order to maintain the quality of construction. Also the current formwork field in India is labour intensive and also skilled labours are also lacking. So to avoid or minimize the manual errors, mivan formwork is being adopted by the contractors for speedy and economic construction. Frequency of accidents in Reinforced Cement Concrete (RCC) construction because of inferior formwork and scaffolding is also accountable. So system Formwork has the challenge of safety during the construction along with faster completion of the projects.

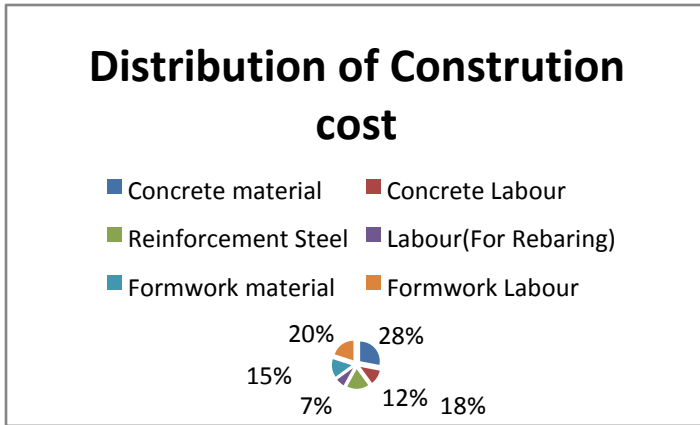
B. Conventional Formwork

The most common material used for formwork of wall is the Plywood sheet in which it is used in combination with timber. Normally, wall forms are framed panels with the plywood facing sheet connected to a timber frame. If the special attention is not given to the corners and joints of the panels, grout may come out in the form of slurry which will lead to poor quality construction. The cycle time for one floor with the use of conventional formwork is minimum 3-4 weeks. Also the block or Brick work and plastering is needed in order to get the finished surface. This takes more time and skilled labours too. This ultimately increases the time required for the completion of the project.

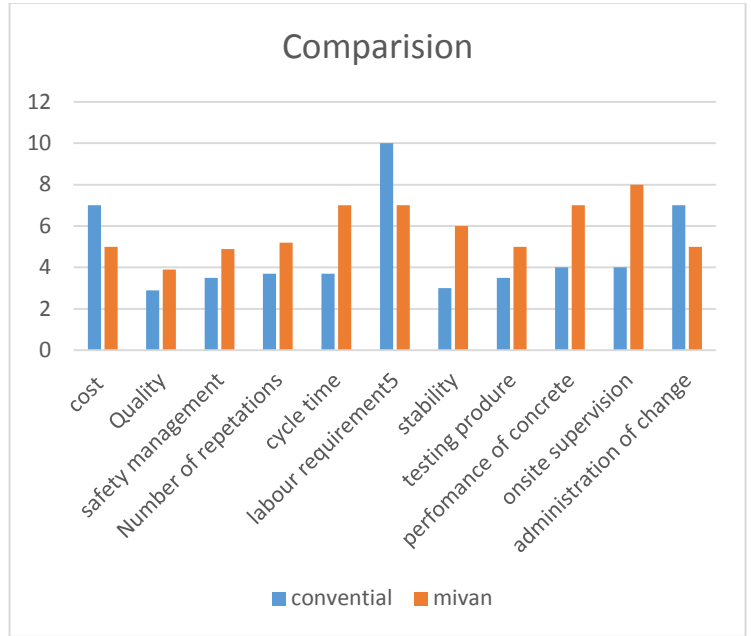
C.Mivan Formwork

The name mivan Formwork itself clears that the approach is systematic. Speed in construction activities will lead to faster construction of concrete which suits the requirements of a particular building. The choice of such Formwork system changes and depends upon required slab cycle, required quality of construction and budget or funds available for the project. Out of them, mivan formwork is the two leading systems.

The distribution of the construction cost is as shown below



Distribution of Construction cost



This is the formwork which can be a good option for timely completion of construction with maximum efficiency. In this system an *Mivan* alloy Al-6061-T6 is normally used. This can withstand the load of about 65 KN/m². In this system of Formwork, *Mivan* panels are placed vertically, attached to eachother with the help of stub pins and wedge pins. In this basically three types of panels are there:

1. Wall-Wall(with and without Rocker ,Wall Top panel, Wall End Panel
2. Beam-Beam panels, Beam Bottom panels, Beam props
3. Slab- Slab panels, Slab prop

Also in addition to this, many types of accessories are also needed in order to maintain the verticality and alignment of wall. Those are wailers, wire rope, ACT props (Adjustable Collapsible Telescopic)

Mivan formwork system is used for a multi storied building construction in order to reduce cycle time .As this is the type of system formwork slab & the wall are cast monolithically. So Mivan Formwork is a fast-track construction method .It is best suited for repetitive type cellular projects. Different components of this system are made up of steel. Normally used for the rooms with span between 2.5m to 6.5 m.

D. Construction waste generation

Construction waste generated during the complete process of formation of a building is also a matter of concern which make us to turn towards Low Waste housings. The Mivan Formwork van give better results than Conventional Formwork for this aspect of comparison. The Following chart gives an idea about the percentage contribution of each item in the generation of construction waste

COST DETAILS

Requirement s	Steel shutterin g	Normal shutterin g	Movin shutterin g	Qty	Remarks
Labour cost	4000%	140%	90%	1	Sqm
Plate	3000%	1200%	7000%	1	Sqm
Steel reinforcemen t	5000%	500%	5000%	1	Sqm
Concrete	4000%	4000%	7000%	1	Cum
Duration	45 days	60 days	10 days	1	
Num of labour	1M+1L+ 2H	1M+3L+ 4H	1L+1H	20	Sqm

III. CONCLUSION

The time plays the main role in the cost of any project and is greatly affected by the type of system adopted. The case study will be helpful for the choice of formwork to be used in coming future. Also this will be helpful to minimize the construction waste due to the formwork.

From the results obtained we came to a finale that when the *Mivan* formwork is utilized in the Villa project, the sum project cost can be reduced by nearly 40 % and the duration of the project can be reduced by 50% compared to conventional formwork.

Although the *Mivan* system formwork is the most costly formwork type in terms of high initial cost, it proves to be economical if the number of repetitions is between 200 and 250 in construction of villa project.

Meanwhile the highest total expenditure is obtained when contemporary conventional kind of formwork is utilized in the building project which is the slightest costly formwork sort.

A floor cycle of 3-10 days can be obtained using formwork and hence the whole project time will be condensed.

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