

Resource Scheduling in Construction Project Using MSP

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Abstract-Every one of us is a manager of projects of our own life. From a house wife to an employee to financial analyst, from banker to doctor, from engineer to administrator, from a teacher to a student, we all work on different tasks with deadlines. The development and application of onsite and precast building is very different in the various countries. Traditionally, cast-in-place construction has been primary method for buildings. Prefabricated systems are a growing technology to aid in rapid building construction to minimize delays. Prefabrication also improves the quality of product because elements are manufactured under controlled conditions in the plant and high-performance materials may be used during casting. Prefabrication also improves safety in the work zone by reducing the amount of activity that is required over traffic or at high elevations to construct the high-rise buildings. Prefabricated Building construction can be used for new projects as well as building rehabilitation. Prefabricated building construction will result in rapid construction and minimized delays during the course of project. System have use MSP for scheduling and controlling all the work. A project resource scheduling reduces the unexpected loss of the project which may be caused due to the huge variations in the usage of the resources. Fast track construction systems use prefabrication components to rapidly erect a construction. The project may have a simple goals that does not require many people or a great deal of money or it may be quite complex, calling for diverse skills and plethora of resources. But the bottom line is that every one of us manages projects. Owing to this the purpose of dealing with the project should not be only execution but effective and efficient execution of project is essential which is needed to be highlighted. Construction Firms in India, Construct the Projects in a Traditional ways, this sometimes proves Uneconomical & Tedious too. Traditional way also proves to be Time Consuming and Confusing. The presented work will provide them an Opportunity to clearly observe the difference between the Microsoft Project (MSP) and the Traditional Planning Techniques which speeds up Construction and also make the Project Cost Effective with Proper Planning with the help of the case study on the single wing of project executed in Pune, Maharashtra, India. For finding out various aspects that proves efficient planning & execution of the project,

disparate methodologies adopted and to find out remedial measures, international journal papers were referred. Methodology adopted includes defining of problem statement, insinuating the objectives from the data collected in two part namely Primary data and secondary, analyzing the data and finally coming to the conclusion.

Keywords-Optimization, Resource Scheduling, MSP, Conventional, Prefabricated.

I. INTRODUCTION

Conventional construction method is the process consisting of cast in situ constructions whereas the precast concrete construction only involves assembly of already casted products in the site. By producing precast concrete in a controlled environment, the precast concrete can be properly cured and be closely monitored by plant employees. 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. In contrast, standard concrete is poured into site-specific forms and cured on site.

Prefab is related to prefabricated construction. The word "Prefab" is not an industry term like modular homes, manufactured homes, panelised home, or site-built home. The term is an amalgamation of panelised and modular building systems which is well planned & designed before the initiation of construction and placement of structure as per detailed design at work site. Prefabricated homes and modular homes are dwellings manufactured in a factory in advance, usually in sections that can be easily transported to the site and integrated. Prefabs are made of composite materials which are manufactured by combination of materials containing different properties such as plastics, concrete and steel. These are specifically designed for longer period of applications or usage.

II. OBJECTIVE

1. The main objective of this work is to evaluate the effectiveness of conventional as well as fabrication method for construction:
2. To study the Conventional & prefabricated building construction.
3. To Analyze the time and cost required for various building components.
4. To compare the conventional and prefabricated building construction with respect to time and cost.

III. LITERATURE REVIEW

Resource scheduling of construction project: case study states by Rhuta Joshi et al., (2013), Explains Several construction activities can be managed to achieve the profit within limited funds and time. Thus project management techniques are useful in scheduling and coordinating the various resources by controlled method. Management techniques such as Critical Path Method, Program Evaluation and Review Techniques (CPM/PERT) have been successfully implemented prior to the 1970's, in various Civil Engineering projects in the countries like USA, Canada, Australia. These techniques help management in efficient and economic use of resources for completion of project objectives with unlimited availability of resources, though it is observed that resources are limited in real project scenario. It has been observed that the project delays occur due to insufficient supply of resources. In large scale projects, preparing an accurate and workable plan is very difficult. Computer packages like MS Project and Primavera project planner are used in construction industry. Project management techniques can be used to resolve resource conflicts and also useful in minimizing the project duration within limited availability of resources to make the project profitable. The main aim of this study is to analyse the Project management techniques by scheduling various construction activities, allocation of resources and resource leveling using Microsoft Project 2013 for residential building. This paper analyses resource constrained project using Microsoft Project 2013 by resource leveling and compares the time cost implications with scheduled time and estimated cost.

Review of project management Software's -MS project and primavera states by S.Ragavi et al.,(2016) & Explains Planning and scheduling is important role in construction projects because of the increasing complexities in this field. Construction Planning is the necessary warning to Scheduling and determining general sequence, defining labor tasks, construction methods and assigning responsibilities. Inappropriate planning can lead to major delays in the project work. For the planning and scheduling work huge amount of paperwork, which makes the management very burdensome?

These problems can be solved using project management software which helps to give a planned approach to planning. In this study, a case of a apartment building has been taken to demonstrate how proper planning and scheduling is done using primavera and MS project. Paper gives results that Planning and scheduling helps in future situation and implementation of the project. Scheduling using Microsoft project Software gives good controlling and clear schedule to a project. This project deals with scheduling using Microsoft project.

Christine Pasquire (2005), this paper presents detail the measurement of risks and benefits of using prefabrication within a construction project. It presents the final part of the IMPREST toolkit. The model field trials raise many questions about existing costing issues that are raised as a barrier to innovation of any sort and apply to directly to the integration of Lean Thinking into construction. Data collection methods included case studies, interactive workshops, interviews and developmental trials. 3 year period data was collected from 30 organizations. One of the principle findings from the trials of the toolkit is that it changes the way construction practitioners think about the information they collect on future projects. The IMPREST toolkit can help to over-come these problems by directing the design team through the decision making process and by influencing the type and quality of data collected from projects. Level of consumption during the construction phases of the project and during operation (indicator of the energy-saving measures).

Krish R. Villaitramani and Dhruv P. Hirani (2014) discusses the case of Mumbai, the city of maximum slum population density in the world, where prefabrication can be a promising solution to housing scarcity. Case study was done on a housing project based on prefabrication technique by TATA group. These houses have an area of 20-30 sq. meters and lifespan of 20 years. Their main findings were less wastage of materials can be achieved due to controlled environment in prefab construction and higher quality control can also be achieved. Prefab construction is less labour intensive due to Computer Integrated Manufacture (CIM).

Mohd Nor Azman (2012) paper present the challenges faced by the construction industry to integrate the prefabrication construction with the existing traditional method and to make the comparative study among the three countries; United Kingdom, Australia and Malaysia. Malaysia applied industrialized building system(IBS), modern method of construction (MMC) is the term used by the United Kingdom. Offsite manufacturing (OSM) is the term used for Australian and UK construction industries. This research studies the pattern of MMC, OSM and IBS to identify the

pattern research scholars in the three countries and precast concrete system become popular system. Review of various Government policies in these countries emphasizing on Prefabrication by various research scholars and comparison of them. This research manages to determine the application of prefabrication by the pattern of prefabrication construction, physical and social factors for implementation IBS, MMC and OSM. Precast concrete system is the most popularly used in the IBS industry as well as for the UK and Australia scholars have stated to encourage applied the precast concrete system.

IV. RESEARCH METHODOLOGY

A residential building was taken for comparing and MS Project schedule was prepared for both the construction methodology (Conventional method and prefabrication method) by using the data inputs pertaining to construction methodology, activities and their durations, materials, resources. Project duration of the each type of construction is collect from the respective companies and compares the time of completion period by using Critical Path method with MS Project gives the total project duration for both type of construction method of data analysis. The data required for the first objective were the final costs and completion times of prefab buildings under each building category. The data analysis involved computing for the following parameters for the jth project within a set for a particular building type.

V. RESULT & DISCUSSION

1. Comparison of conventional & prefabrication Method in Terms of Resources.

Resource Table on Conventional Construction Method

Table 1: Resource Table on Conventional Construction Method

Resources	Man-Hours	Rate/day	No. of Workers	Total Cost
Labour	16992	300	2124	637200
Bhisti	4680	250	585	146250
Mason	3624	450	453	203850
Bar Bender	3072	400	384	153600
Carpenter	1536	400	192	76800
Electrician	560	450	70	31500
Total				1249200

Resource Table on Prefabrication Construction Method

Table 2: Resource Table on Prefabrication Construction Method

Resources	Man-Hours	Rate/day	No. of Workers	Total Cost
Labour	9432	300	1179	353700
Bhisti	4296	250	537	134250
Mason	2832	450	354	159300
Bar Bender	1152	400	144	57600
Carpenter	567	400	72	28800
Electrician	144	450	18	8100
Skilled labour	2208	500	276	138000
Total				879750

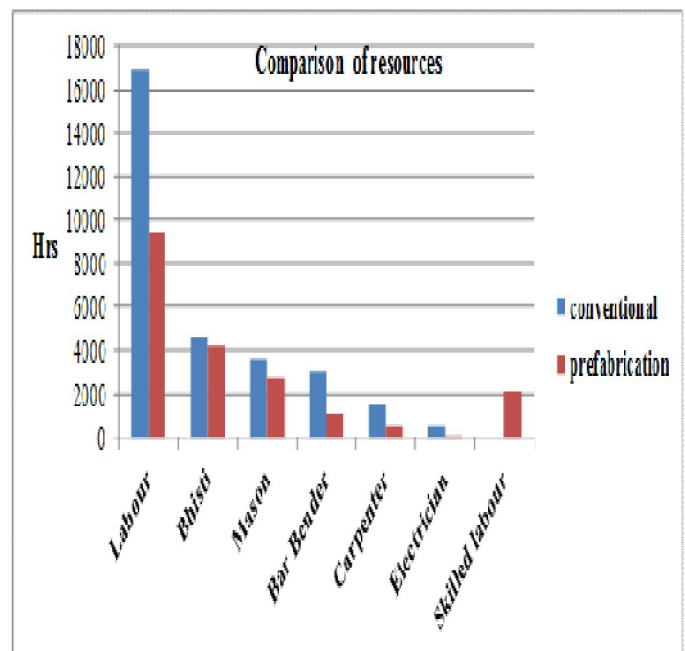


Chart 1: Comparison of Resources in Conventional and Prefabrication

2. Comparison of Conventional and Prefab in Terms of Duration

Project Duration Table for Conventional construction method

Table 3: Project Duration Table for Conventional Construction Method

Sr. No.	Description	Duration
1	Sub Structure - (Excavation, Foundation, Plinth)	28 days
2	Super Structure - (Column, Beam, Slab, Wall)	177 days
Total Duration		205 days

Project Duration Table for Prefabrication Construction Method

Table 4: Project Duration Table for Prefabrication Construction Method

Sr. No.	Description	Duration
1	Sub Structure - (Excavation, Foundation, Plinth)	28 days
2	Super Structure - (Column, Beam, Slab, Wall)	101 days
Total Duration		129 days

VI. CONCLUSION

The duration of prefab construction and convention method construction was found by preparing MS project schedule with the help of the data inputs from the respective companies. The duration of structure work is taking into the consideration. The duration of the project is showing Substructure and superstructure. The duration of substructure remains same in both the case as method of construction up to substructure remains same. From our study we found that a considerable amount of time can be saved by using prefab construction method. Precast beams, columns, slabs are manufactured in precast yard and can be installed at site, which reduces the time and human resources considerably.

The following conclusion can be drawn from the study:-

1. By using partial prefabrication in the residential project considered in this study can reduce the project duration by approximately 38%.
2. Indirect saving in cost due to reduction in man-days for the completion of structure work is approximately 30%.
3. The prefab construction takes less time in finishing work as electrical conduits and fittings are already installed in precast slab and wall panels.

4. Savings in plastering cost and time can be considered because finishing of prefabricated components are better than in-situ component.

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