

MANPOWER RESOURCE MANAGEMENT USING MSP SOFTWARE

Dr. P P Bhangale

Abstract: Many projects suffers time and cost overruns due to improper planning, scheduling and execution works that results in several issues like delay in providing facilities, development, reduction in quality of construction and making the project more expensive. A little consideration shows that the time required to complete the project is inversely proportional to the supply of manpower. As the manpower is increased, the completion time of the project is decreased and on the other hand if the manpower is decreased, the completion time of the project is increased.

The present study deals with the manpower planning, scheduling and tracking of "Construction of a Residential high rise building, Mumbai, a 20 storied building project whose construction is in progress is schedule in Microsoft project for man power planning in duration form February 2016 to October 2016. A visit was conducted at the site and completion to collect the relevant data time to time so that proper input could be incorporated n the software.

Report in MSP 2010 are obtained regarding network chart, Resource usage chart, Gantt chart, use of each resource in the entire schedule is also determined which enable the planner to exactly identify the requirement of particular labour in as per the schedule as well as activity. This was concluded to be quiet helpful in high rise construction involving difficulties in planning of manpower.

IndexTerms - Component, formatting, style, styling, insert.

I. INTRODUCTION

Manpower planning is a process used for determining the size of the work force that will be needed to do the work that will have to be done at a future date. Many projects suffers time due to improper planning, scheduling and execution of manpower planning that results in several issues like delay in providing facilities, development, reduction in quality of construction and making the project more expensive. A little consideration shows that the time required to complete the project is inversely proportional to the supply of manpower. As the manpower is increased, the completion time of the project is decreased and on the other hand if the manpower is decreased, the completion time of the project is increased.

Workers at the project site are made to execute a specified function and its connected tasks. These workers include engineer, construction workers, supervisors, operators, drivers, and administrative personnel. Construction involves multi skill technology for its wide range of related activities. These skills vary with nature of job, type of project, and corporate policy of the contractor. For ease of estimating, planning, accounting, and controlling; the project workers are classified based on trade wise. Further, these are divided into two groups, namely, direct manpower and indirect manpower.

Building infrastructures in India has now become formidable challenge which can only be met by adopting innovative construction technology. Construction work involves different activities carried out by diverse processes by skilled and unskilled workers, and needs to be completed within planned time schedule. To maintain such time schedule, construction processes need to employ new tools and techniques in project management. So the need for better construction practices systematized planning and programming of works and effective management in the industry, is therefore the demand of the day.

Objectives of Report

1. To develop the manpower planning by actual case study on high rise structure.
2. Analysis of manpower planning of above case study including scheduling of resources, allocation of manpower and balancing the over allotted manpower resources using MS project.
3. Recommendation and suggestion on manpower resource planning.

Methodology of Project

1. Actual manpower planning is developed by analyzing and study of detail schedule of work on high rise building
2. Allocation of manpower is workout by using MS project.

The major steps involved in our work using Microsoft project software are:

- Defining Project Calendar.
 - Selection of Task Mode.
 - Manual Schedule Mode.
 - Entering Task.
 - Creating work breakdown structure.
 - Scheduling the project.
 - Assigning manpower.
3. Based on the above work findings will be drawn and necessary recommendation will be given on each factor causing problem in manpower planning.

II. LITERATURE REVIEW

INTRODUCTION

Investigation in 'Human Resource Management' is a vast topic having a huge research going on several aspects of this topic. Various authors have different contribution in their own respective method or technique. It becomes intense need to learn and understand the views of various authors from various parts to give our own contribution on this topic. Purpose of this chapter in this report is to highlight the work done on study of HRM in construction and give some terms which will be useful further in this report.

AUTHOR BASED REVIEW

Maruthi S (2015) carried out studies in two phases at first phase the project schedule and resource allocated done using MSP software and at second phase, optimization has been carried out by modifying the man power requirement for various tasks to remove any sudden variations in demand of manpower. And concluded manpower resource has been optimized by modifying the particular activities duration and by modifying predecessors without affecting the project duration.[1]

Rhuta Joshi (2015) analyzed man power resource constrained project using Microsoft Project 2013 by resource leveling and compares the time cost in residential building . It helps to resolve resource conflicts and also useful in minimizing the project duration within limited availability of resources to make the project profitable .they concluded that without proper resource scheduling the project gets delayed and they can be leveled to reduce project duration and cost.[2]

B.S.K. Reddy (2015) they done resource optimization exercises on two on-going projects in Dubai, UAE. they individually leveled and then combined option with aggregated and then levelled clearly indicates reduction in demand of resources by 5.65% in later option, which could be best considered for economy . they concluded Resource levelling at project job site and forwarding demand leads a possible sharing of resources among projects. Ismail Abdul Rahman identified commonly used techniques and software of time management together with their effectiveness level in large construction projects. Data was collected from the construction organization that deals with huge projects. Relative Importance Index calculation was employed to assess the level of effectiveness for time management techniques and software adopted in the construction project. Minh Shrestha, hinted that the main function of a software is help, and develop the quality of output with less effort than manual ways. A project has disparate requirements and the aim of the adopted software is to fulfill those requirements effectively in terms of time and cost. In addition, the issues of scheduling, tracking and physical element must be considered while adopting the project management software.[3]

Abhishek Sharma(2015) Many project suffers time and cost overruns due to improper planning, scheduling and completing works that results in numerous issues like delay in providing facilities, development, cutback in quality of construction and making the project more expensive. A little consideration shows that the time required to complete the project is inversely comparative to the supply of manpower. As the manpower is increased, the completion time of the project is decreased and on the other hand if the manpower is decreased, the completion time of the project is increased. A comparison between the baseline duration and cost to actual duration and cost of manpower of project is also determined using project management software tool Microsoft Project. The schedule report is examined and causes for delay are analyzed. This delay is due to inadequate manpower, contractor not starting the multitasking activities at site, shortage of shuttering material and the work executed by the activity in haphazard manner at site.[4]

P M Wale(2015) skills and Techniques to project activities to meet project requirements. It is a planned ability to do something successfully for organizations, enabling them to patch the project results to Organizational goals and thus, superior battle in their markets. the process and activity of planning, organizing exciting and controlling resources, procedures and protocols to achieve complete goals in scientific or daily problems. that help to overcome the problems faced outstanding to traditional way of Planning and Management. It helps for the optimum and effective organization of activities which helps to give the vision to complete the project in planned duration and within the market[5].

J. Jayalakshmi(2014) ,This study compared time performance of the conventional method of construction for high- rise residential and Industrial Building System (IBS) method by overall construction period . The scheduling was developed using Primavera project planning software. The positive changes include creating a healthy working environment among those involved directly in the construction industry. The major players in the are architects, engineers, town planner, developer, contractor and the supplier or manufacturer have to play their roles in enhancing their working system, management and administration to enable the modernization in the industry.[6]

E. Suresh kumar(2015) Scheduling using MSP Software is a development which involves estimation, sequencing the activities, resources allocation and timing. The construction scheduling is to complete the project in time and equal the resources with the allocated time. EV Analysis is a standard method of measuring a project's progress at any given point of time, forecasting its completion date, final cost and analysis difference in the schedule and budget of the project. Scheduling using MSP Software gives good controlling.[7]

Rhuta Joshi (2013) achieve the profit within little funds and time by using project management techniques for 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 in various Civil Engineering projects. These techniques help management in capable and economic use of resources for completion of project objectives with infinite availability of resources, though it is observed that resources are limited in real project scenario. It has been practical that the project delays occur due to inadequate supply of resources. Project management software like MS Project and Primavera project planner are used in construction industry. The Project management techniques by scheduling various construction activities, allocation of resources and resource leveling using Microsoft Project for residential building.[8]

Raj saran(2015) Planning and scheduling is very significant in construction projects because of the increasing complexities in this field. Construction Planning is the necessary predecessor to Scheduling and includes major work tasks, determining universal series, construction methods and conveying tasks. Improper planning can lead to most important delays in the project work. Projects nowadays huge amount of paperwork, which makes the management very bulky. These problems can be solved using a project planning software which helps to give a structured move toward to planning. In this study, a case of a two storey research lab has been taken to demonstrate how proper planning and scheduling is done using Primavera software.[9]

Sushant pradhan(2014) Every construction industry expression a stiff struggle in every section of project, be it technique, equipment, methodology or management. The goals are been created and the level is getting higher. Construction Industries involve themselves in frequent projects and also aim for higher yield as financial benefit is the ground certainty. The task becomes tougher when one indulges to maintain customer satisfaction i.e. quality and duration at the same time. Rarely have the companies failed to attend the assure. Companies in the past have faced a lot of problems particularly when it comes to multiple projects. The data are stuffed, the cost has been overrun, the duration is extended and the resources have been over-allocated. Thus resulting in inappropriate project management.[10]

T. Subramani (2014)This study compared time performance of the conventional method of construction for high- rise residential and Industrial Building System method by originate level measures of industry norms for overall construction period using scheduling simulation modeling. The positive changes include creating a healthy working environment among those involved directly in the construction industry.. Improved Customer Satisfaction Whenever you get a project done on time and under budget, the client walks away happy. And a happy client is one you'll see over. Smart project management provides the tools that enable this client/manager bond to continue. Services The same strategies that allowed you to successfully complete one project will serve you many times over and also reduced risk and cost of schedule swamped. It helps easily plan and manage project activities, It optimizes management of all resources, It gives clear visibility of what's going on in the project, It allows quick and easy forecasting of WBS's, activities or projects.[11]

Y.Umesh(2015) Proper planning and scheduling is very essential in construction projects for sinking and scheming delays of the project. Extensive amounts of time, money, resources are wasted each year in a construction industry due to improper planning and scheduling. With globalization the construction projects have become infinite and complex. Planning of such projects requires huge amount of paperwork, which can be reduced with the help of project planning software. These study are to plan, schedule, and track a residential project with help of primavera software, study the results generated, it is possible to propose which method is suitable for the chosen residential project.[12]

Veena H.C(2015) Resource management is one of the most vital aspects of construction project management in today's economy since the construction industry is resource exhaustive and the costs of construction resources have gradually, risen over the last several decades. These techniques help to reduce project duration use of unlimited availability of resources for completion of a project. Through it is observed that resources are limited in real project situation. It has been observed that the project delays occur due to inadequate supply of resources. In large scale projects, preparing a correct and workable plan is very difficult. Project management software like MS Project and Primavera project planner are used in construction industry. The main aim of this study is to analyze the schedule control techniques by constraints and activity types is done using primavera software for an apartment building. [13]

Milorad Zlatanovic, Author presents short view of management development, like as significant step and necessity for modern management employing in civil engineering. As there are numerous definitions of management depending on an author, only the most important are presented, namely the most acceptable in civil engineering domain. Special attention is paid to managing functions in civil engineering as well to their correlations. Management in civil engineering is not applied seriously, which is an absurd considering significance and specific character of building industry for community, especially taking account fight for survival and necessity of building company development. If we talk about management in civil engineering total quality management must be mentioned. Total quality management is a business philosophy and existing way of modern companies around the whole world. It is the most modern concept of advancing and developing in all life and work domains. [14]

Martin Loosemore, In writing this book they have also attempted to maintain a balance between theory and practice. They have done this by drawing upon mainstream organizational behaviour and HRM theory and exploring its application within the unique context that the industry presents. As the case studies and discussion contained within the text emphasize, they do not believe that there is a single definitive model for managing people in the construction industry. There is no magic formula for resolving the significant HRM challenges which the construction industry poses, but they hope this book will help managers develop and explore approaches which reflect the particular needs of their organization, project and employees.[15]

Prashant Pralhad Padasalkar, authors have been studied about the following points: Economical growth rate of any country depends upon number of people in work & their productivity. Skill is at root of productivity. Efficient use of skill enables to do proficient work with increase in productivity. India is the second fastest-growing economy in the World & construction industry is the country's second largest economic activity after agriculture. Human capital is the most important asset to a construction company. Presently Indian construction sector is suffering from acute shortage of skilled labour & in future situation will be more critical. As per a survey about 83% of the workers are unskilled and majority of them are women. Training to worker is backbone for skill development. On the job training and certification methods are measures to improve skill & employability factors. [16]

Dag Roll-Hansen, The workshop gathered staff working with Human Resources both in the Provincial offices of INE and at the central level. The workshop had three main goals:

- i Increased understanding of SIGEDAP, and how it can be used to lead and develop staff members. Main aspects of this is setting clear priorities and goals for the work and helping the employees to perform better. This can be done by discussing how they can improve their performance, as the performance evaluations are conducted.
- ii. Illuminate and discuss new developments in the field of Human Resource Development and Management, aiming to gain a better understanding on how to deal with human resources at INE
- iii. Develop a draft Human Resource Policy.[17]

Josephat Stephen Itika, It consist of Human Resource Management that are published, year after year, for use in HRM classes. Authors of those introductions face many challenges, such as the need to produce something that is both theoretically sound and practically valuable, or to find a way to integrate discussions on a variety of topics into one comprehensible teaching tool. The author of this book took up those challenges by, on the one hand, closely following the conventions that HRM scholars all over the world adhere to with regards to the demarcation of subfields within The HRM discipline, and on the other hand, including a multitude of Tanzanian and other African cases that put each of these subfields in a vivid context. [18]

Literature Gap

Literature survey mostly consist of studies involving scheduling and manpower studies by various methods. some authors used different software's to schedule the activities and allocate resources. In this project report it is aim to allocate resources in each activity in high rise structures and determining the results by software itself.

III. MANPOWER PLANNING ON HIGH RISE STRUCTURE

Project was selected in Mumbai (India) of G+20 building having following Amenities

- Tennis court, club house and children's play area
- Ample parking
- 2-screen Broadway Multiplex & a Food Court housed in the same complex
- Concealed Copper Wiring with modular switches
- Granite kitchen platform with stainless steel sink and 4'6" high dado tiles above kitchen platform
- Jaguar or equivalent bathroom fitting
- Good quality CP and sanitary fittings
- High quality electrical switches
- Intercom connectivity
- Branded automatic lifts

Salient features

- 3 floors of commercial/retail space planned for departmental stores, boutiques, Broadway Multiplex and a food court
- Fire safety measures
- Aesthetic elevation
- Earthquake-resistant structure
- Vitriified flooring
- Designer ceramic tiles and toilets

STEP WISE METHODOLOGY FOR ENTIRE SCHEDULING IN MSP

Step I: Defining Project Calendar

A working calendar is defined in which the working days in a week and the working hours are specified. In this study, the name given to the project calendar is standard and the timings are 9:00 AM to 6:00 PM with a lunch break of one hour between 1:00 PM to 2:00 PM. The calendar is 8 hours working per day, 6 working days in a week, and 25 to 26 working days in a month exluding Sunday as non working day.

Step II: Selection of Task Mode

The Task mode gives option whether a task is scheduled manually or automatically.

Manual Schedule Mode

The manually scheduled task placed anywhere in schedule and Project won't move it. This new feature gives greater flexibility and control over planning and managing schedule.

Auto Schedule Mode

Automatic scheduling provides a highly planned, systematic means of managing the project schedule. Project calculates the earliest and latest dates for tasks for the optimal schedule.

Step III : Entering Task

The task is individually entered in auto schedule mode in the Microsoft Project software. The tasks are normally entered in the order that they occur. The task duration is entered in terms of days only. Information of milestones in the project is also entered.

Step IV: Creating Work Breakdown Structure

After the complete planning of a project, the next step is to create work breakdown structure (WBS) to define and organize the project elements at different levels. A WBS represents a hierarchical breakdown of a project into elements. At first level of work break down structure, a project in Mumbai is created. Inside this, Block B is created. Then inside this Block B, project break down structure like excavation and earthwork, substructure, superstructure, brick work including door frame, lintel work, internal plaster, waterproofing work, external plaster, finishing work and service work are created.

Step V: Scheduling the Project

After all the tasks are entered along with their respective duration, the information of task dependencies is specified by specifying predecessor of each of the task. The information is entered using predecessor column of the software. The four types of task relationships or inter dependency are FS, SS, FF and SF. The default relationship in the software is finish to start with zero lead and lag.

Step VI: Assigning Manpower

A manpower can be defined as the number of people that is required to complete the task and is assigned to an activity. It is suggested to create and allocate the minimum number of resources to activities. When the project schedule is completed with the activities, duration, start and finish dates for each activity and for the whole project, next step is to define and assign resource to the activities.

Manpower Allotment in the resources is based on assumption as prescribed in table below for various work and labour required for this data is as per the Rate of Analysis of Harmony Project, Mumbai.

IV. MANPOWER PLANNING ON HIGH RISE STRUCTURE

This Chapter Deals with the analysis of manpower planning of high rise structure considered in case study. It consists of resource planning and analysis. It describes the Scheduling and Gantt chart showing the critical activities. Further in this chapter resource usage for each chapter is determined and analysed by its chart and schedule.

TASK SCHEDULING AND CRITICAL PATH

Task when schedule in MSP and linked Gantt chart is obtained showing the critical activities and critical path in red colour. This is shown in the chart below showing all the activities in Gantt chart, blue indicating non critic activities and while red indicating Critical Activities.

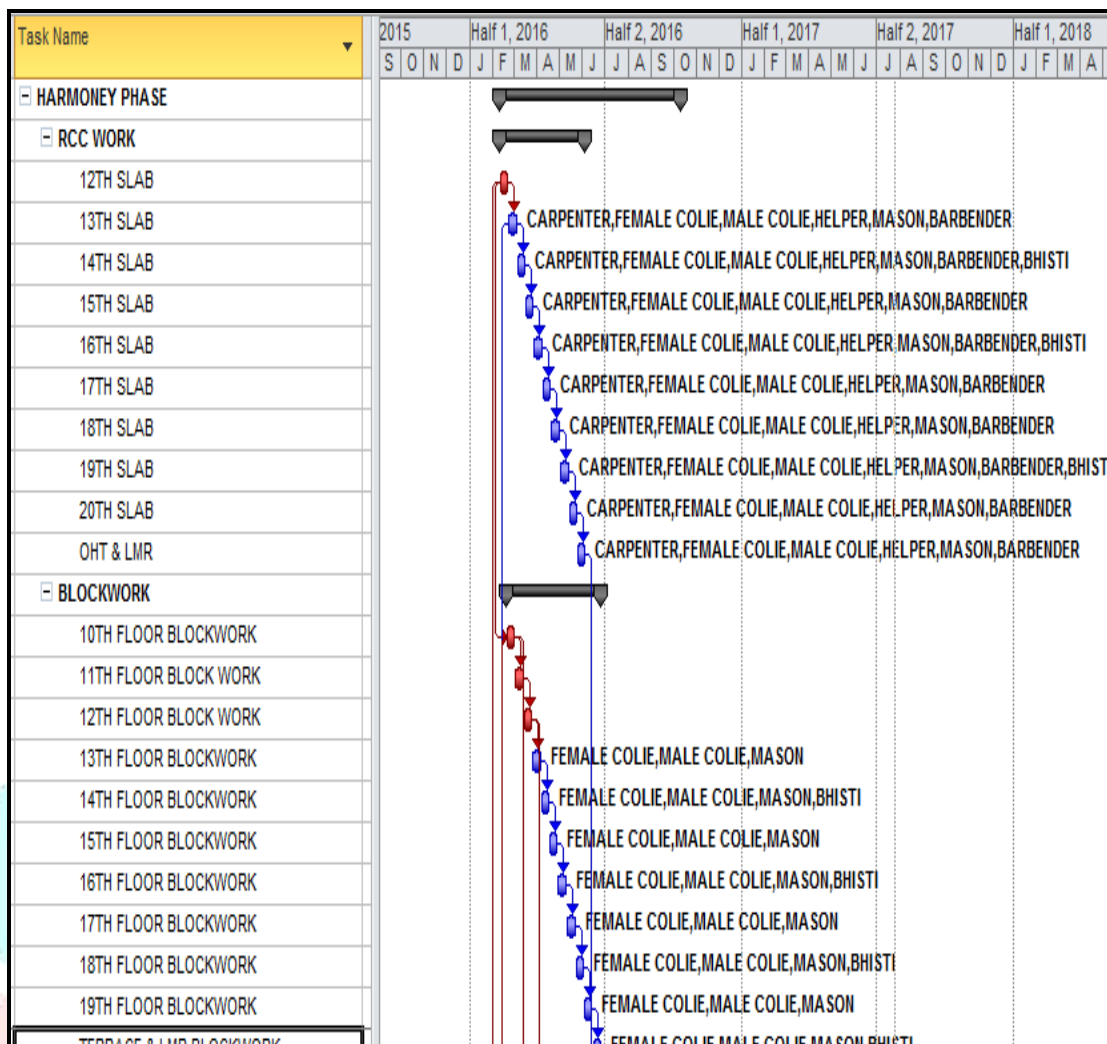


Chart I Showing Part of Gantt chart of the Project Schedule in MSP

Study conducted to analyze to schedule the activities at the site to produce the entire resource usage and team planner of each resource for entire of the high rise residential building.

X axis indicated percentage of usage while y axis of graph indicates its sage in particular duration of time

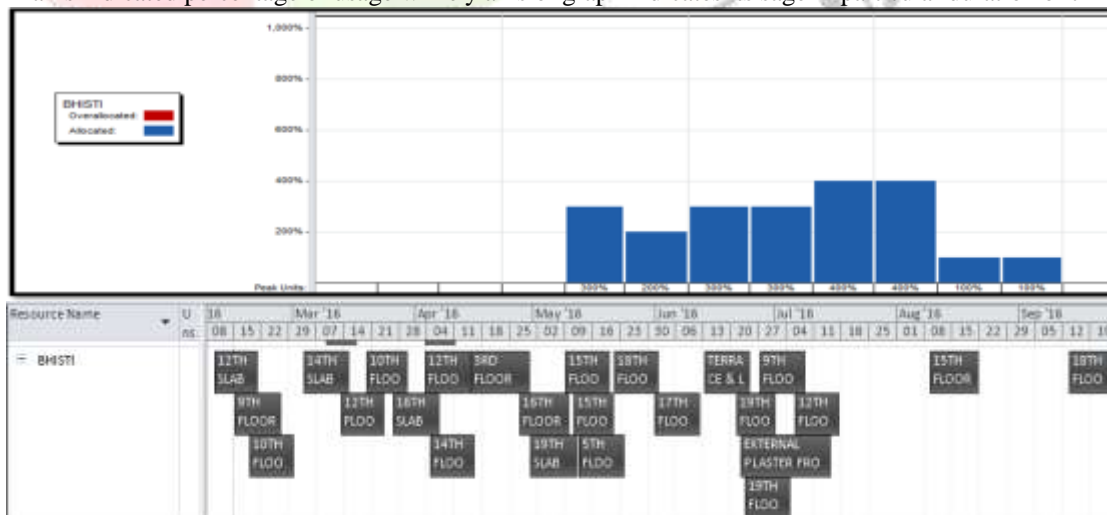


Chart II Showing Resource usage of bhisti along with team planner

X axis indicated percentage of usage while y axis of graph indicates its sage in particular duration of time

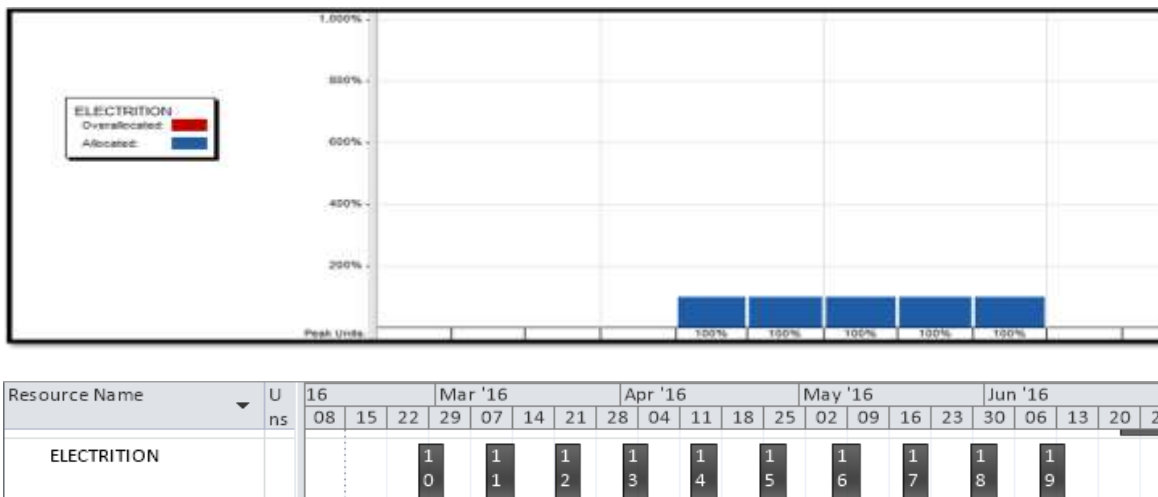


Chart III Showing Resource usage of electrition along with team planner

X axis indicated percentage of usage while y axis of graph indicates its sage in particular duration of time

Similar Usage chart for each is prepared and manpower scheduling is monitored.

RESULTS AND DISCUSSIONS

1. For data analysis each activity of construction of building are found out and noted down, which are used in MSP software for working.
2. Practical construction sequence is understood during field training and is used in linking of activities in MSP along with provision of necessary lag (Float) in predeceasing and succeeding activities.
3. Creating a Plan and the key elements of a plan like WBS, activity duration, and their dependencies etc. should be implemented from the basic idea of planning.
4. The positive changes include creating a healthy working environment among those involved directly in the construction industry. The major players in the are architects, engineers, town planner, developer, contractor and the supplier or manufacturer have to play their roles in enhancing their working system, management and administration to enable the modernization in the industry.
5. Developing and implementing the right HRMS for every company is important. While it is certainly possible to take care of these functions manually, an automated system ensures there is plenty of time available for the human resources staff to develop and maintain the data that goes into those systems.
6. Critical Path Activities in high rise building project case study conducted are, twelfth slab, 10,11 & 12 blockwork, external plaster of 12 floor, flooring of third fourth and fifth floor and Internal painting work.
7. Float is available for most of the activities in the harmony project which also can be seen in blue colour of most of the activites very few activities are having zero float which indicated that project is well scheduled and can be well managed and planned.
8. The software Microsoft Project 2013 is the popular tool in modern days to manage the project efficiently. The software also helps to enhance project manager’s efficient performance towards wastage of resources and its minimization during construction process.

This chapter consist of case study for high rise Building at Mumbai, includes basic information of project, use of Microsoft Project to Scheduling of activities, Manpower allocation, and network formation and finally manpower resource module is developed.

III. CONCLUSIONS

As explained above, the management of time and manpower is the prime factor that affect greatly to the efficient and timely completion of the project. This is the management that sets up the relations among various activities and helps the site engineer to fix the priorities of task. Having the information about the availability of the manpower and have those available at right time for the activities plays a vital role in managing the costs and smoothly executing the project activities. Brief Conclusions drawn regarding the project is as shown below:

1. Labour productivity must be given extreme importance in calculating the activity duration and reliable plan, and knowing the well-founded methods in the computation of various labour productivities and for its improvement.
2. The relationship between the tasks and their interdependencies should be known. Identification of various drawings required for the execution of works, and listing out various activities involved in a project and their sequential order should be prioritized.
3. Creating a Plan and the key elements of a plan like WBS, activity duration, and their dependencies etc. should be implemented from the basic idea of planning.
4. Critical path and critical activities of the project should be identified and Scheduled based on Project start date and Project end date.

5. WBS should be created based on the project deliverables and the advantages of creating a WBS using deliverable over WBS created on the basis of trade.
6. It is important to crosscheck the drafted plan with the drawings. As well as Activity durations, their allotment should be assessed correctly.
7. Developing and implementing the right HRMS for every company is important. While it is certainly possible to take care of these functions manually, an automated system ensures there is plenty of time available for the human resources staff to develop and maintain the data that goes into those systems.

REFERENCES

- [1] Maruthi S, Dr. J.R.Patil, Rohit S. Agawane “Optimization for Fluctuation in Resource Demands in Construction Projects” ISSN: 2395 -0056 Volume: 02 Issue: 03 June-2015
- [2] Rhuta Joshi, Prof. V. Z. Patil “Resource Scheduling of Construction Project: Case Study“: 2319-7064 Volume 4 Issue 5, May 2015
- [3] B. S. K. Reddy, Sk. Nagaraju, Md. Salman “A Study On Optimisation Of Resources For Multiple Projects By Using Primavera” ISSN 235 – 248, Vol. 10, No. 2 (2015)
- [4] Abhishek Sharma* And K.K. Pathak “Manpower Planning, Scheduling and Tracking of a Construction Project Using Microsoft Project Software” ISSN: 32011 Vol. 3, No. 2, December 2015
- [5] P M Wale1, N D. Jain, N R Godhani2, S R Beniwal, “Planning and Scheduling of Project using Microsoft Project” Volume 12, Issue 3 Ver. III (May. - Jun. 2015)
- [6] T. Subramani, A. Sarkunam, J. Jayalakshmi” Planning and Scheduling of High Rise Building Using Primavera” ISSN 2248-9622 Vol. 4, Issue 6(Version 5), June 2014
- [7] E. Suresh kumar, S .Krishnamoorthi “Scheduling and Financial Analysis of a High Rise Building” ISSN: 2278-1684 Volume 12, Issue 6 Ver. I (Nov-Dec. 2015)
- [8] Rhuta Joshi, Prof. V. Z. Patil “Resource Scheduling of Construction Project: Case Study“: 2319-7064 Volume 4 Issue 5, May 2015
- [9] Raj saran, Neel fondekar, Yash matalia,” planning and scheduling of a two storey building Using primavera p6.”
- [10] Sushant Pradhan, Rajendra .S, Vijay.K “ planning, scheduling and resource optimisation of multiple projects using oracle primavera p6”ISSN: 2321- 7308, Volume: 05 Issue: 06 | Jun-2016
- [11] T. Subramani, A. Sarkunam2 J. Jayalakshmi “Planning and Scheduling of High Rise Building Using Primavera ISSN : 2248-9622 Vol. 4, Issue 6.
- [12] Rohit.R.Salgu,Umesh.Y.Polekar,” Planning, Scheduling and Tracking of a residential Project using Primavera Software” ISSN: 2321-7782
- [13] Veena H C, Vijay K “Schedule Control of an Apartment Building using Primavera Techniques” ISSN: 2278-0181, Vol. 5 Issue 06, June-2016
- [14] Milorad Zlatanovic” Management In Civil Engineering And Its Developing Tends”, Dragan Veličković March 17, 1999
- [15] Martin Loosemore, Andrew Dainty and Helen Lingard, ‘Human Resource Management in Construction’ Routledge publication, 2003.
- [16] Microsort Project Guide, online Library of Microsoft.
- [17] Digital Library of India.