

TO STUDY ADVANCED PROJECT PLANNING AND SCHEDULING-CASE STUDY

Mr. Gunjal Kartikeyan¹, Mr. Rohit Gholap², Mr. Ranjeet Katkar³, Mr. Prasad Khune⁴, Prof. Pooja Bhosale⁵

Department of Civil Engineering Sinhgad Academy of Engineering, Kondhava Pune, India

Abstract: Project management is an area which is increasingly in demand in both large and small companies. Many mistakes are made during the first few weeks shaping the project scope, leading up to a plan and a schedule. Project management focuses on areas like working with clients, managing scheduling and budgeting, and analysing the risks which a project can face. Various strategies like critical path method, Gantt chart, Work Breakdown Structure, time-scaled arrow diagram, line of balance chart, S-curve, activity on node diagram, resource allocation chart, and so on Many project management methods is used for work schedules; they could be different in the way of giving less or more information, and selecting them would be based on the goal of our project and project requirements.

Keywords— *Planning, Scheduling, Organization, Construction management, Activities, Resources, Material*

INTRODUCTION

Project Planning and Scheduling is one of the most important activities for a Project Manager when starting and managing any type of project. Many mistakes are made during the first few weeks shaping the project scope, leading up to a plan and a schedule. During my career as Project Manager and Manager of Project Management Offices I have come across many emerging and junior Project Managers who were lacking the initial understanding of what was important for the lead up to building a schedule.

Proper planning, scheduling, tracking and application administration are the major parameter in construction industry. The systematic flow of work is adopted by using techniques called Critical Path Method and Programme Evaluation and Review technique. The state for management of the project .and the goal intended to attain project planning is to bring forth a time table of work with each activity. The main goal intended from the project is to complete with proper plan and schedule within the gross budget allotted for actual project. The complete process of using resources and to achieve quality in construction can be done by proper project management. The Oracle primavera p6 software includes all possible details to scale with multi-project planning control even for a wide range of projects, thus proper resource allocation and project portfolio management can be achieved by sitting on single system. Planning, scheduling, tracking and administration application in primavera is an advance technology in construction industry which requires the study of material, manpower, improved design and hence improves the construction management technique.

- Project Management Function- planning, organising, staffing, directing and controlling
- Planning and scheduling is breaking down project into different activities & task also defining logical sequence of events and by providing activity time that will deliver a completed project.
- A pre-planning for project process must be organised as formal, well organised planning process with specific deliverables.

To execute such variable works in different phases of project, any big construction company has to keep artillery of various plants and equipment's supported by an army of skilled and semiskilled manpower. In highway projects, the total project corridor is usually divided into sections and further to sub-sections for the ease of working and resource allocation. The resources are generally allocated to the working teams / groups on the basis of their productivity level and total volume of work allotted to the respective teams. Any disparity in the expected level of output compared to actual output level could lead to untimely completion and cost overrun and actually indicate improper prediction of the productivity level leading to wrong estimation of production rate. For the above reasons, it is quite necessary to study the productivity of the different resources in detail for highway sector. The same equipment's and sometimes evens the same manpower being used in different activities, a detailed study, categorization and analyses of productivity of resources for different activities are very necessary. Identification of the factors affecting the productivity of each of the resources along with formation of graphs, formulas and charts to estimate production is also essential for the easy going of the job of planning.

The objective of the project was to minimize time and cost by leveling the resources and this was done by taking three cases to compare the optimized results. In Case 1 the entire project was considered to be done in the same order of WBS without breaking it into parts and the cost incurred by the utilization of resources is calculated. In Case 2 the entire project was divided into two parts and the cost incurred by the utilization of resources is calculated. In Case 3 the entire project was divided into three parts and the cost incurred by the utilization of resources is calculated.

Planning and scheduling is an integral part required for efficient execution of construction activities. Project management software's are trending for helping the manager's for better handling of time and other resources. Microsoft Project is one such software aiding in increasing the overall project efficiency. In Road Construction, Equipment's play a major role as they manage more than 50 % of the work, so their Costs and Productivity play a major role in

Double-Blind Peer Reviewed Refereed Open Access International Journal

making the Project profitable to the company. In this work a Case Study of two Road or Pavement Construction sites is carried out. Efforts are taken to improve the Productivity of Equipment's by using Project Management Techniques which in turn helps to cut down the Costs incurred.

Resource Planning Construction Equipment: Production task needing equipment include excavating, handling, transporting, filling, compacting, grading, hoisting, concreting, pre-casting, plastering, finishing, trenching, and laying of pipes and cables. The supporting equipment at project site consists of generators, transmission lines, pumping sets, other utility services equipment. Construction equipment is indispensable in execution of modern high-cost, time bound massive construction projects. It produces output with an accelerated speed in a limited time. It saves manpower, which is becoming ever more costly and demanding. It improves productivity, quality and safety and also adds a sense of urgency. Acquisition of equipment mass involves initial heavy investment but, on the whole, its adds to profitability by reducing the overall costs, provided it is properly planned, economically procured and effectively managed.

Productivity means the ability to produce. The term 'productivity', as commonly understood, implies the ratio of output to input. The input and output can be measured in physical quantities, monetary terms or a combination of both. Many link productivity to mean of workers' output capability; they express productivity as work quantity produced per man-hours of input. Productivity is also defined as monetary value of output per man-hour of input. Some consider productivity as performance output in rupees for every rupees of input. In the narrower sense of controlling project resources, the productivity concept is used to measure the performance of resources.

A Resource Schedule will show which resource is assigned to which task. It lists the individual resources of a category (for instance, all employees, or all machines) and shows what each of those resources is assigned to do on a timeline that can be displayed at an hourly, daily, weekly or monthly scale. Individual work items such as tasks or jobs are called Events in Visual Planning and shown as blocks of color on the schedule. Events can also be non-working to represent unavailability. If multiple types of resources are used, users can easily switch from one resource schedule view to another or display several schedules at once. This is called Multi-Resource Scheduling.

The proposed worked used primavera for 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. A study on the optimization of the schedule of resource constrained construction project.

In today's world construction industry is one of the most widely used and rapidly booming industry of our nation and across the world. Hence, it is considered to be the second largest industry of India in terms of generating huge amount of revenue and employment. Though the construction and infrastructure industry being second largest industry of our nation (India), the identity and recognition of this industry has not been grown in all dimensions of the country

Especially, at the remote places like small villages, rural places and the large part our country is by these small villages and rural habitats. Therefore there is a requirement of certain tools and techniques for the improvement of national economic upliftment, adequate land use and their environment planning to manage with

the level of improvement in town and urban areas and the time required to tackle this goal can shortened. There is an intense necessity for effective Project Management.

Project Management

Before you begin to format your paper, first write and save the content as a separate text file. Keep your text and graphic files separate until after the text has been formatted and styled. Do not use hard tabs, and limit use of hard returns to only one return at the end of a paragraph. Do not add any kind of pagination anywhere in the paper. Do not number text heads-the template will do that for you?

Project Planning is a general and most common term in construction management which refers to attain the expected goals and destinations. Planning is the key to bring the expected projects into reality or in existence. Therefore, the term 'Project Planning' has been used at various platforms to get the close meaning of different things. Generally planning involves the breakdown of the undertaken whole project works into small definable, identifiable and quantifiable tasks or activities or works and then constitutes the logical interdependencies between them. Basically, the process of Planning refers to 3 dominant questions, they are as below

- i) What is to be done..?
- ii) Who does it..?
- iii) How to do it..?

Scheduling refers to slotting out the time duration by the thorough and explicit analysis of the planning tem to each and every activity to know the final project duration and the project delivery date. In other words it governs the timing of each work activities recognized by the planning process before or during project execution. Typically it shows and signifies the sequential order or phasing various individual project activities in a systematic way to complete the project. The schedule is a tool or a technic of every project management team which is used and practiced to predict most probable project completion time and thus enabling the in/ on time resources conception which are budgeted on the particular work.

The general steps to develop a proper schedule are as follows

- Proper time estimation of every activities
- Project planner should know the obligations of time for the project completion and delivery.
- The activities such as must start and must finish should be establish well recessed.
- Sorting out of activities which are crucial to timely completion of project should be recognized and kept in mind

The main objective of this study was to understand the role of monitoring and control in the progress and timely completion of a construction project. This objective was achieved through revision of literatures and methodologies involved in monitoring and control. For efficient recourse management planning and controlling of a construction project it is very necessary to use project management software. This study represents the importance of resource management in a large construction project. Only because of efficient resource management by Primavera P6 overall cost of a construction which sometimes increases due to wastage of recourse is controlled delay in time also decrease. The case study proved to be a guideline in understanding the progress of a residential colony construction project. The companies which do not use primavera software tools efficiently have to increase their investments in training and educating their employed project teams. In large construction project efficient resource management reduce the unwanted wastage of resource also cost of overall project. The

Double-Blind Peer Reviewed Refereed Open Access International Journal

use of such software's helps to complete the project on schedule time and cost.

RELATED WORK

B.S.K Reddy, SkNagaraju and Md Salman (2018): In this they describe the important of resources allocation by taking two ongoing project of Dubai (UAE). They carried out the informal interview with the site supervisor and project manager. They collected the required data for the resources leveling for both the project. Based on optimization of resources for the project; a company can improve the profitability and productivity of the organization. [1]

Shaikh Mohammed Masood, Devand and Harsh H.N (2018): A case study of duplex apartment has been taken for analysis of resources planning of cost estimation and tracking of the project. They have adopted earn value management technique. That is use for work forecast in progress. To know what will happen in future with respect to cost estimation of the project. The base line is set to control the cost. The main purpose to adopt earn value analysis is to analysis the whole cost change in resulting in time, cost overrun of the project. So that corrective measure to be taken. Schedule used to predict the advance future performance of the project completion. [2]

PeltheSaranges and PramilaAdavi (2012): They describe about the various application in primavera with a concept of computer integrated enterprise project management. The application of organization is a breaking down structure of a project for a responsible manner. The application resources optimization for proper productivity. The application of risk management for priority level and the project cost and project current date can't be change. [3]

Divya R and S.Ramya (2015): The main objective of the author is to identify the major causes of delay, effect of delay and method of minimizing delay in construction project. Data has analysis to establish the relative importance of various factors that provides a particular quality or character to cause the effect in construction delay. [4]

Unmesh YPolekar and Rohit.RSalgude (2015): The author describe about construction planning and challenging activities in management work during the execution. The scheduling is done for time management of each event or activities in the project. The tracking is done for actual project performing value. But it's a small residential building having very less activities. The importance of the planning, scheduling and tracking of the residential project using primavera is to know the comparison between planned and actual executed schedule. [5]

Aim

The main of the study is to create effective project schedules and control and to recognize key elements of schedule control and planning also to apply best practices in scheduling projects

Objectives

- To establish an approach that over the long term will reduce uncertainty
- To minimize the chaos and efficiency losses resulting from disconnects with the schedule, priority changes, emergency work
- To study and apply the six-Sigma Technology and Identify impact of delays

- Case study and Questionnaire Survey
- Six Sigma has been evaluated considering financial and technical aspects by construction professionals
- Implications of Six Sigma based on quality, performance and management aspects

Problem Statement

The purpose to conduct this study is to find out the advanced project planning and scheduling techniques for a construction project within timely and within budget completion.

Problem with current scenario

- The construction industry in general is characterized with highly unorganized, low productivity, cost and time overruns, and conflicts compared with other industries.
- Effective management by applying six-sigma is an innovative to address these problems from systems perspective.
- The Six Sigma technique is mostly used to enhance the quality of product, reduce cost and process improvement for the construction industries
- Identifies the different quality and cost reduction techniques used in selected industries
- Find out various processes which reduces source of variation and improves quality and productivity, results increase in customer satisfaction.

Need of the study

- Goals Become More Achievable
- It Keeps Your Costs Down
- They Prepare You for Unexpected Problems
- Everyone is on the Same Page
- Progress is Easier to Track

Scope of study

- Determining and entering project phases, milestones, deliverables and tasks
- Plan schedule management
- Define project activities
- Sequence activities
- Estimate resources
- Estimate durations
- Develop the project schedule

LITERATURE REVIEW**Application of Primavera Software For Scheduling of Row House to Complete Project On Time Nisarg M. Mistry, Mayank A. Kanani, Dr. Neeraj D. Sharma, Rushabh A. Shah**

In this project a case study is taken for our project situated at we knew that by conventional techniques of construction is very long due to no forecast of how the Tirupati society Kadoli Road, Maroli of Suresh Chandra Magan bhai Patel. By interviewing contractor whole project finish. In this case study we applied primavera P6 without resource allocation to give the way to contractor to finish the project by arranging the whole activities of project in step by step.

Application of Primavera in Construction Industry

Pethe Sarang & PramilaAdavi Many studies have shown that the primavera application has positively impacted the productivity of planning processes and later its execution. Its potential impact on the entire life-cycle of construction project is to the fullest extent. Some high potential parameters in primavera application), which significantly affect the project results (positively), are discussed

Resource Management in Construction Projects – a case study, SK. Nagaraju, B. Sivakonda Reddy. August 2012

Construction Project refers to a high stake Endeavour aiming at time

Double-Blind Peer Reviewed Refereed Open Access International Journal

bound predetermined performance objective. Unless matching resources are planned and procured, no activity can be executed according to a prefixed time schedule. Project managers must take complex decisions under different scheduling needs (such as smooth resource utilization profiles and resource constraints) and under conditions of uncertainty that sometimes extend beyond task durations. The present study deals with resource scheduling for a fast track project with constrained durations. The study has been carried out in two phases. In the first phase, with the aid of PRIMAVERA software project schedule for various activities for the construction of a commercial building was prepared. Subsequently, requirements of resources were attributed to the activities based on Standard Schedule Rates. The requisite data has been collected from the detailed drawings and prevailing site conditions.

Resource Scheduling Of Construction Projects Using Genetic Algorithm Devikamalam. J1, Jane Helena. H

Resource allocation and leveling are among the top challenges in project management, due to the complexity of projects. The main objective of this project is to optimize the schedule of construction project activities in order to minimize the total cost with resource constraints using Genetic Algorithm.

Resource Scheduling in Construction Project Using MSP Nikhil R. Mahajan, Vaishali Joshi, January 2017

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. Regardless of our occupation, norms, or location in an organization, we all work on tasks that are eclectic and involve people who do not usually work together. 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.

Study On Resource Planning In Highway Construction Projects^[1] K Swarna Kumari, J vikranth

In this paper they studied the resource planning and productivity can, thus help in good resource planning, better monitoring and overall controlling of the project. For the better understand they were taken a case study on B.R.T.S. project at Vishakhapatnam. At the site location they collected data in which the data wise requirement of project manpower, costly equipment, production costs, sales or earned value of work done and expected income. After collection of data they have done resource planning in that Planning of construction work force, planning of construction material, planning of construction equipment. The most general objective of planning is to improve to provide a link between the establishment of an effective productivity measurement system and the human task of improving organizational performance by means of changes in all or several elements of the organization-the people, structure, culture and technology. They observed that in highway projects, the same resource is often used for different activities and the productivity of that resource being different for different activities; it becomes inevitable to know the correct norms for correct estimation, planning and monitoring.

Equipment cost for any project comprises of mainly 20-30% of project cost plus additional cost for maintenance, repair and operation. Cost of equipment has to be controlled properly by efficient allocation of equipment for different phases of work. So for using equipment effectively and efficiently equipment becomes necessary. Equipment procurement is done after measuring productivity of every equipment. Material cost for any project which is more or less invariable, it depend mainly on type of project work to be performed. Material planning is done to achieve requirement of project at different phases of construction work and it also reduces excessive wastage of material. Manpower Planning is the process by which an organization ensures that it has the right number and right kind of people, at the right place, at the right time, capable of effectively and efficiently completing those tasks that will help the organization achieve its overall objectives. In any project, most of the activities are done —team-wisely and productivity of individual labour cannot be determined. Also teams productivity is depend on driving equipment such as grader, roller, paver etc...

The Planning of BRTS Road Project by using Microsoft Project 2007 for 013 KMS and Existing Carriage indicate poor planning of resources. Also equipment assign for total project is less as compared to required number. From the planning of BRTS highway project after allocating resources to various activities, we come to know if Equipment and manpower is provided as per required data which is analyze by using Microsoft Project-2007 as compare to actual used on site. It will help to complete project on time with specified duration as per contract.

Resource Optimization in Road Construction Projects^[2]

K sri Bindu, U. Jayasanthosh Kumar

In this paper they studied in highway projects, the same resource is often used for different activities and the productivity of that resource being different for different activities, it becomes inevitable to know the correct norms for correct estimation, planning and monitoring. For the detailed study they taken three cases study and plan their resources by understanding productivity of each of the resource and its use for a particular activity using Microsoft project. They used MSP software for resourced planning, scheduling and allocation. In order to optimize the cost and duration in construction projects resource optimization is required. This may be used for the expansion of M.G Road from Patamata to Machilipatnam (NH-9).

The objective of the project was to minimize time and cost by levelling the resources and this was done by taking three cases to compare the optimized results. In Case 1 the entire project was considered to be done in the same order of WBS without breaking it into parts and the cost incurred by the utilization of resources is calculated. In Case 2 the entire project was divided into two parts and the cost incurred by the utilization of resources is calculated. In Case 3 the entire project was divided into three parts and the cost incurred by the utilization of resources is calculated.

Overall they concluded that by scheduling the project in three different types, three different time schedules are obtained and the respective resource allocations are also achieved. From the resource allocations and the time schedule of the three cases the optimal resource utilization is identified by the cost comparison. By performing the resource leveling the cost of the project has been reduced by Rs 9,27,474.72. From the above analysis conducted, the optimal solution is Case 2 with the reduction of cost to Rs 9,27,474.72 where the total cost is Rs 16, 70,59,530.3 which

Double-Blind Peer Reviewed Refereed Open Access International Journal

is the least cost of the three cases due to the reduction in duration. Optimization of Resources in Highway Construction^[3]

Vishnuraj RG, Vishak MS

The project is carried out to have a study about resource Management in highway constructions and its implementation. In recent year's project management software systems like MS Project, Primavera etc. have been improving continuously and recent versions have exhibited better interfaces, integrated planning and control features, and Internet capabilities. Yet, basic project management functions such as resource allocation, resource leveling, and time cost trade-off analysis have been the least improved. The Construction projects, especially the highway construction projects, uses huge amount of resources on and off the field in various forms of resources viz., materials, plants, equipment's and human resources along with money, time and space.. Production and operation sequence management is the process of controlling production and services the main objective of which is to match efforts with application of resources and equipment's in order to best produce and serve. Effort is made to use available resource and time in a desirable way and prevent resource and equipment waste. Data collection is done by questionnaire survey and it is used to find Benefits of resource management, causes of failure of resource management and causes of resource fluctuation etc.. Project management software primavera is used in order to complete the project on time under budget.

They concluded the visit to highway project site and study of available database in the project site reveals that the construction companies in India have neither yet realize the necessity of detail study of their own resources nor have develop their accounting system for research and development purpose has evident from the lack of useful and relevant data from the site. The present construction practices in India is still adopt the methodology of as and when required,, resource management. Lack of professionalism leading to lack of detailed and meticulous planning and irrational decision making as per site management is concerned leading to underutilization of resources to a great extent. Till now project resource planning is only limited to planning and scheduling with time but resource mobilization and usage planning according to their capacity and availability, ahead of time in the planning stage, is still nobody's concern. Equipment cost for any project comprises of mainly 20-30% of project cost plus additional cost for maintenance, repair and operation. Cost of equipment has to be controlled properly by efficient allocation of equipment for different phases of work. So for using equipment effectively and efficiently equipment becomes necessary. Equipment procurement is done after measuring productivity of every equipment. Material cost for any project which is more or less invariable, it depend mainly on type of project work to be performed. Material planning is done to achieve requirement of project at different phases of construction work and it also reduces excessive wastage of material. Manpower Planning is the process by which an organization ensures that it has the right number and right kind of people, at the right place, at the right time, capable of effectively and efficiently completing those tasks that will help the organization achieve its overall objectives. In any project, most of the activities are done team-wise and productivity of individual labourers cannot be determined. Also teams productivity is depend on driving equipment such as grader, roller, paver etc. From the planning of highway project after allocating resources to various activities, we come to know if Equipment's and manpower is

provided as per required data which is analyze by using Primavera as compare to actual used on site. It will help to complete project on time with specified duration as per contract.

Productivity Escalation and Cost Optimisation of Equipment's used in Pavement Construction^[4]

Pankaj Suresh Rayamane, Amey A. Kelkar

In this paper they studied cost optimisation of equipment used in pavement construction. The aim of this work is to highlight the importance of Productivity of Equipment's used in Pavement Construction and its Cost. In construction, some tasks are labour-intensive, some pre-dominantly employ equipment and some use a combination of both, i.e., labour and equipment. In big infrastructure projects like Road or Pavement projects, equipment's and the plants play a crucial role in the production process. While the actual work done and the associated labour is accounted for by the foreman concerned, the equipment productivity control is undertaken to determine its employment time, the output achieved and its productivity at the site. The main purpose of equipment productivity control is to minimize the wastage in utilization and to minimize the Costs.

Planning and scheduling is an integral part required for efficient execution of construction activities. Project management software's are trending for helping the manager's for better handling of time and other resources. Microsoft Project is one such software aiding in increasing the overall project efficiency.

In Road Construction, Equipment's play a major role as they manage more than 50 % of the work, so their Costs and Productivity play a major role in making the Project profitable to the company. In this work a Case Study of two Road or Pavement Construction sites is carried out. Efforts are taken to improve the Productivity of Equipment's by using Project Management Techniques which in turn helps to cut down the Costs incurred.

A productivity management of road construction in Thailand^[5]

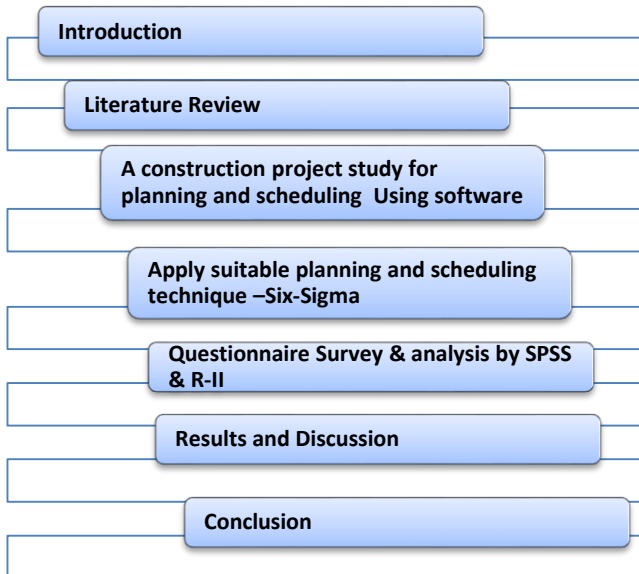
Wisoot Jiradamkerng

This research's objectives were to conduct a work study of sub base course of road construction and implement productivity analysis with EZ Strobe simulation system. The study had divided construction process into 3 parts. Each part of the process was simulated with EZ Strobe to find optimum construction team members with minimum unit cost. These optimum team members were used in simulation model of each part to determine basic time with 95% confident interval and 5% limit of error. Then, the standard time and productivity of each construction team was calculated in various units; production per hour (cu.m./hr., sq.m./hr.), daily production (cu.m./day, sq.m./day, m. of road/day), and number of hour required per section of sub base course construction (200 m. in length). After that, the overall process simulation model including Part1 to Part3 was created, representing for all 26 sections of sub base course construction.

The analysis results showed that optimum team combination of Team1, Team2 and Team3 for the minimum unit cost of sub base construction was 2-1-2; and for the minimum duration of construction was 3-2-3. The outcomes of this research pointed out that, with EZ Strobe simulation system, the productivity management could be done effectively by conducting work study at project site and simulating for alternative resources management plan to determine for optimum construction teams according to the desired project goals.

Methodology

Double-Blind Peer Reviewed Refereed Open Access International Journal



DATA COLLECTION

The process of project management is guided by three key principles:

- Planning
- Controlling
- Managing

Planning a project

The first step in project management is to define your project.

- ✓ What is the scope of the work? What activities will make up the project and what is their relationship to each other? You'll also want to identify the major milestones that will help you monitor the project's progress.
- ✓ What is the project duration? What are the dates when the project will begin and end?
- ✓ What resources are available to the project? Beyond labor, think about all the types of resources you will require.
- ✓ Who will perform what tasks? Determining your labor resources and their available work hours is a key part of building a successful project. You'll need to plan for downtime and holidays and determine the regular workweek for various staffing types.
- ✓ How much will the project cost? What are the costs per resource? Are there any hidden project costs?
- ✓ What is the estimated budget? Establishing a project budget estimate in advance helps you monitor possible cost overruns. The answers to these questions from the framework of your project

Controlling a project

Once you have built your project and estimated your budgeting needs, you save this original plan as a baseline, or target schedule, to help you control the project. A baseline provides a solid point of reference as your schedule changes over time. It allows you to compare the original schedule to the current one and identify significant changes and develop contingency plans. You control a project to keep it heading in the right direction. You'll want to track work progress and costs, compare them to your baseline, and then recommend what actions should be taken.

Effective project control reaps many benefits. It allows you to keep

a close eye on possible problems before they become critical. It lets the project team and senior management view cost and scheduling timeframes based on the reality of the schedule.

Managing a project:

The process of guiding a project from start to finish is the responsibility of a project manager. A good project manager wears many hats, acting at various times as a motivator, communicator, coordinator, and advisor. As you control the project's progress, it is your job to keep your team aware of changes to the schedule and possible consequences. In many ways, you are the project's ambassador, ensuring that your project organization is carrying out its responsibilities for the best possible outcome. To be an effective project manager also requires consistency when you update your projects. Select a day each week, or biweekly, when you will regularly update projects. This regular update will include progress on values such as

- Dates on which activities started or finished
- Dates when resources are consumed
- Changes to resource rates

Determine a standard policy for the update and scheduling procedure, and for reporting progress.

The Project Management module provides many tools to assist you in reporting progress to both team members and senior management. Use the Project Web Site option to create a central location where team members can view project progress. Consider the many system reports as a means for communicating change. In addition, senior management can use the Portfolios section of P6 Web Access to summarize project data and easily capture a snapshot of how a project or group of projects is progressing.

PLANNING & SCHEDULING

- Determining and entering project phases, milestones, deliverables and tasks
- Understanding, choosing and entering dependencies and deadlines
- Determining human and material resources and costs
- Assigning and fine tuning resources within their availability
- Optimize and present the plan to stakeholders for approval
- Life Cycle Costing
- Concepts on Cost
- Developing Project Budget
- Developing the Project Quality Plan
- Developing the Communication Management Plan
- Developing the Risk Management Plan / Risk Register
- Selecting the Contract Type
- The Vendor Selection Process
- Planning best practices and checklists
- Baseline the schedule

Executing

- Team Building and Motivation
- Leadership Styles
- Conflict Management
- Solving Team Problems
- Tracking strategies and updating schedule
- Taking corrective actions to bring project back on track
- Analyzing and revising the schedule
- Status reporting
- Executing best practices and checklists

Double-Blind Peer Reviewed Refereed Open Access International Journal

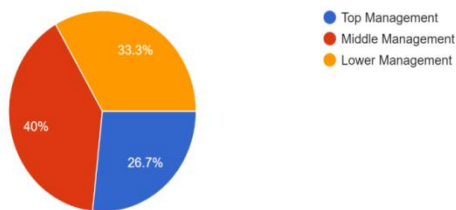
Monitoring and Controlling

- The Monitoring and Controlling Loop
- Managing Changes
- Managing Corrective and Preventive Actions
- Measuring and Reporting Performance
- Project Reporting
- The Seven Basic Tools of Quality
- Quality Control Measurements
- Performance Appraisals
- Status Review Meetings
- Project reporting strategies
- Progress reporting using reports and views
- Forecasting efforts, dates and costs
- Maintain and control baseline
- Monitoring and controlling best practices and checklists

DATA ANALYSIS

SPSS SOFTWARE & QUESTIONNAIRE SURVEY

Among the many available methods in collecting data two methods were adopted; these are literature review and questionnaires. The first step involves general information collection, including both first-hand and second-hand data, in order to identify major themes from the literature. In the second step, with the literature review and unstructured interviews, important factors of safety were identified. With these factors, a questionnaire was formed and Survey was conducted. The questionnaires were distributed through various electronic media platform to a variety of respondent working around the construction projects. About 100 people have responded to the questionnaire survey. The respondents were asked to indicate the positions they held in the respective companies and the duration for which the company is in operation. They were provided with options to choose from. About 26.7% of the respondents who participated in the study are from Top management background, 40% were from middle management, while 33.3% were serving as a lower management as shown in the Fig.



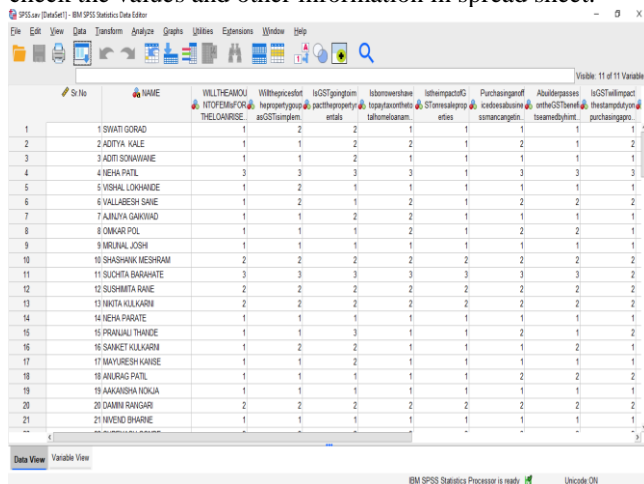
SOFTWARE

Analysis of the questionnaires survey was done using IBM SPSS Software. SPSS Statistics is a software package used for statistical analysis. The software name originally stood for Statistical Package for the Social Sciences (SPSS), reflecting the original market. It is a Windows based program that can be used to perform data entry and analysis and to create tables and graphs. It is capable of handling large amounts of data and can perform all of the analyses covered in the text and much more. It is a widely used program for statistical analysis in social science. It is also used by market researchers, health researchers, survey companies, government, education researchers, marketing organizations, data miners, and others. All the responses obtained from the questionnaires are entered in to the software. First, the variables or the questions are entered in the data view, then, the responses are entered into the software from the various data

entered into the software, frequency can be found which is used to determine the importance factor.

SPSS data View

The Questionnaire Survey responses were reported in excel file. After opening data, SPSS displays them in a spreadsheet-like fashion as shown in below figure. The excel file was export in data View and check the values and other information in spread sheet.



SPSS Variable View

An SPSS data file always has a second sheet called variable view. It shows the metadata associated with the data. Metadata is information about the meaning of variables and data values. In Variable View, different columns are displayed. Each line corresponds to a variable. A variable is simply a quantity of something, which varies and can be measured, such as height, weight, number of children, educational level, gender and so forth. Name of the variable it is your own choice, but make it understandable and do not use numbers or symbols as the first letter since SPSS will not accept it. Moreover, you cannot use spaces in the name. The name of variable was used such as EMI, Construction material etc.

SPSS SPSS Data analysis:

SPSS can open all sorts of data and display them -and their metadata- in two sheets in its Data Editor window. In our data contain variable holding respondent related questions we can compute the frequency by navigating to Descriptive Statistics as shown in below fig. For better understanding and detailed study pie charts and Bar chart option is also selected.

SPSS Output Window:

After clicking Ok, a new window opens up, SPSS output viewer window. It holds a nice table with all statistics on all variables we chose. The screenshot below shows what it looks like. As we see, the Output Viewer window has a different layout and structure than the Data Editor window we saw earlier. Creating output in SPSS does not change our data in any way; unlike Excel, SPSS uses different windows for data and research outcomes based on those data.

RII MANUAL METHOD

Double-Blind Peer Reviewed Refereed Open Access International Journal

The sample for this study is relatively small. As a result, the analysis had combined all groups of respondents (clients, consultants, contractors and regulatory boards) in order to obtain significant results. Data was analyzed by calculating frequencies and Relative Importance Index (RII). The data analysis was carried out using SPSS. SPSS was used to generate the frequency (fi) of the response category index for the cause and effect factors. The relative importance index (RII) for each factor was calculated using the frequency data for each response categories generated from SPSS. Assessment of questionnaire was carried out using 3 point likert scale from 1 to 3 representing can be not at all, no, most of the times, yes respectively. Data analysis was done calculating Relative Important Index (RII) by following formula.

$$RII = \sum W / A * N$$

Where, W = weight given to each factor by respondents (1-3)

$$\sum W = 3 \times W_3 + 2 \times W_2 + 1 \times W_1$$

A = highest weight (i.e. 3)

N = total number of respondents (Ex. 100)

CASE STUDY

- It was categorized into profile of the respondent and various factors affecting construction industry.
 - Questions in the respondent profile were created to collect information such as job position, experience of the work, locations of the current and/or previous works and contact information.
 - The set of questions was prepared and targeting the factors/sources affecting on Planet.
 - This simple and straight method was selected to establish a means of developing a list of factors affecting cost
- These numerical impact values are assigned to the respondents' rating:
- 1: Yes
 - 2: No
 - 3: Other

SITE DETAILS

- Structure Type: Residential Building Construction
- Construction Type: RCC Construction
- Name of the builder: Fortune, Pune
- Location: Handewadi, Pune
- Total project Cost: 12.45 Crores
- Total Length: 50/30 m
- Date of Commencement: November 2019
- Completion period: 36 Months
- Construction Type: RCC Frame Structure.
- No. of Floor: G+12 Floor
- Total Area of Building: 2, 15000Sq.ft.
- Plinth Area: 10150/- Sq.ft
- RCC Contractor Name: Mr.Tilekar
- Authority Engineer: Harshi Chaddha
- Local Authority: PMRDA, Pune
- Walls: 230 mm thick brick masonry walls only at periphery.

RCC Design Consultant: G. A. Bhillare Structural Consultant Pvt. Ltd

TEST TO BE PERFORMED

- In this thesis from questionnaires' analysis find main root cause of problem and defect using DMAIC methodology and the plans to minimize them. DMAIC also used to increase the quality as well as reduce the performing time in a simultaneous manner.
- By using Six Sigma process and design like insights and plan of examinations to quantify, dissect, improve and control the cycles such that meet consumer requirement and financial benefit.
- DMAIC methodology used for continual improvement method which offers a systematic strategy to control and coordinate all involved processes in any construction project

SURVEY REPORT

Q.No.	Have you heard about Construction Waste management?	Frequency	Percent	Valid Percent	Cumulative Percent
1	1	32	80.0	80.0	80.0
	2	8	20.0	20.0	100.0
	Total	40	100.0	100.0	

Q.No.	Are you aware of waste management in your area?	Frequency	Percent	Valid Percent	Cumulative Percent
1	1	28	70.0	70.0	70.0
	2	10	25.0	25.0	95.0
	3	2	5.0	5.0	100.0
	Total	40	100.0	100.0	

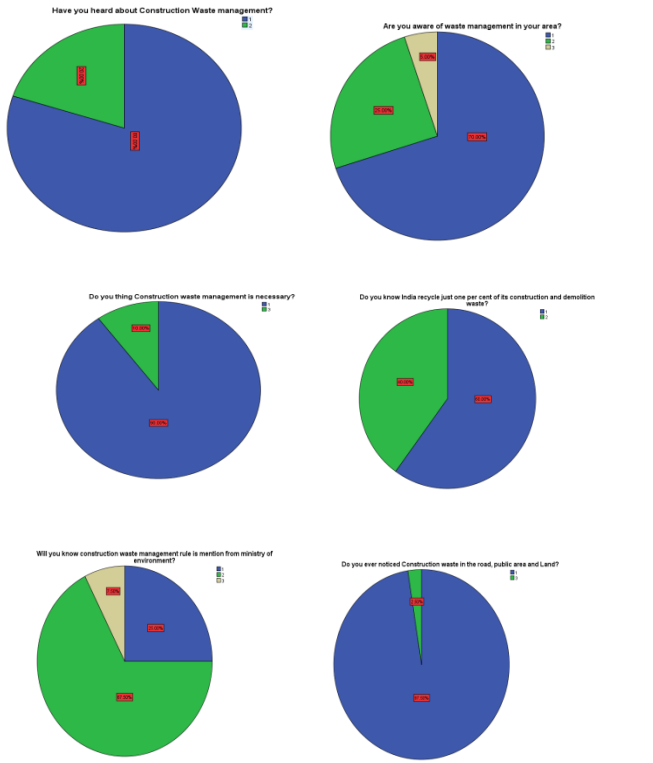
Q.No.	Do you ever noticed Construction waste in the road, public area and Land?	Frequency	Percent	Valid Percent	Cumulative Percent
1	1	39	97.5	97.5	97.5
	3	1	2.5	2.5	100.0
	Total	40	100.0	100.0	

Q.No.	In India, Do you thing Construction waste management is good?	Frequency	Percent	Valid Percent	Cumulative Percent
1	1	17	42.5	42.5	42.5
	2	17	42.5	42.5	85.0
	3	6	15.0	15.0	100.0
	Total	40	100.0	100.0	

Q.No.	Do you know India recycle just one per cent of its construction and demolition waste?	Frequency	Percent	Valid Percent	Cumulative Percent
1	1	24	60.0	60.0	60.0
	2	16	40.0	40.0	100.0
	Total	40	100.0	100.0	

Q.No.	Do you thing Construction waste management is necessary?	Frequency	Percent	Valid Percent	Cumulative Percent
1	1	36	90.0	90.0	90.0
	3	4	10.0	10.0	100.0
	Total	40	100.0	100.0	

Double-Blind Peer Reviewed Refereed Open Access International Journal



Sr. No.	Questions	YES%	NO%	Other%	Total	Total/No.	A/N	RII	Rank	Mean	Std Deviation	Variance
1	Have you heard about Construction Waste management?	80	20	0	100	300	0.45	4	12	0.495	0.84	0.706
2	Are you aware of waste management in your area?	70	25	5	100	300	0.35	2	11	0.376	0.100	0.010
3	Do you ever noticed Construction waste in the road, public area and Land?	97.5	0	7.5	105	300	0.325	2	11	0.376	0.100	0.010
4	In India, Do you think Construction waste management is good?	42.5	57.5	0	102.5	300	0.575	3	17	0.716	0.512	0.262
5	Do you know India recycle just one per cent of its construction and demolition waste?	80	40	0	100	300	0.4	4	12	0.500	0.250	0.063
6	Do you think Construction waste management is necessary?	90	0	10	100	300	0.5	3	15	0.549	0.302	0.091
7	Will you know construction waste management rule is mention from ministry of environment?	25	67.5	7.5	100	300	0.325	2	11	0.376	0.100	0.010
8	Have you ever heard about the importance of recycling in construction industry?	40	47.5	12.5	100	300	0.425	3	15	0.549	0.302	0.091
9	Do you use construction waste management system on your site?	35	52.5	12.5	100	300	0.425	3	15	0.549	0.302	0.091
10	Have you use any method for waste disposal or Recycling material?	60	32.5	7.5	100	300	0.425	3	15	0.549	0.302	0.091
11	Does it effect on quality using recycled material?	40	55	5	100	300	0.425	3	15	0.549	0.302	0.091
12	Does cost-benefit analysis affect the project cost?	42.5	57.5	0	100	300	0.425	3	15	0.549	0.302	0.091
13	Do you think there is enough information about the environmental impact due to Construction waste?	20	70	10	100	300	0.3	2	11	0.376	0.100	0.010
14	Do you think Construction and demolishing waste management has impact on sustainable development?	87.5	0	12.5	100	300	0.425	3	15	0.549	0.302	0.091
15	Can you say that to increase project productivity by reducing and eliminating the wastes?	82.5	12.5	5	100	300	0.425	3	15	0.549	0.302	0.091
16	Do you think by decreasing waste we can decrease the project cost?	82.5	10	7.5	100	300	0.425	3	15	0.549	0.302	0.091
17	Do you think using recycle material benefit the total project cost?	85	0	15	100	300	0.425	3	15	0.549	0.302	0.091
18	Have construction waste management have effect on project cost?	65	22.5	12.5	100	300	0.425	3	15	0.549	0.302	0.091
19	Do you think most environmental issues in India could be minimized if Construction Waste is managed properly?	80	15	5	100	300	0.425	3	15	0.549	0.302	0.091
20	Do you think Cost-benefit analysis should be done before starting construction?	62.5	37.5	0	100	300	0.425	3	15	0.549	0.302	0.091
21	Do you think by using automation technique wastages of material is decreased?	67.5	22.5	10	100	300	0.425	3	15	0.549	0.302	0.091
22	Do you use new technology for construction of building?	42.5	57.5	0	100	300	0.425	3	15	0.549	0.302	0.091
23	Is that affect in reducing wastages?	80	20	0	100	300	0.425	3	15	0.549	0.302	0.091
24	By giving proper training to mason increase the productivity of work and decrease the wastages of material?	62.5	25	12.5	100	300	0.425	3	15	0.549	0.302	0.091
25	Not following construction step induced rework and that also increase construction waste?	62.5	12.5	25	100	300	0.425	3	15	0.549	0.302	0.091
26	Does electrical and plumbing work increase the rework?	67.5	20	12.5	100	300	0.425	3	15	0.549	0.302	0.091
27	By proper storage of material on site reduced the wastages of material?	80	10	10	100	300	0.425	3	15	0.549	0.302	0.091
28	Do you think main reason of steel waste is because of irresponsible beam reinforcement and fabrication cutting?	72.5	20	8.5	100	300	0.425	3	15	0.549	0.302	0.091
29	Do you think using BIM over traditional method decreased the waste of material?	80	15	5	100	300	0.425	3	15	0.549	0.302	0.091
30	Now, do you use Construction waste management system on your site to increase the productivity and decreasing the cost of project?	100	0	0	100	300	0.525	4	19	0.600	0.000	0.000

The questionnaire were distributed over large construction as well as small construction projects including the group of workers including site engineers, Painter, steel binder, Plasterer, Meson Brickwork, Carpenter, Gardener for Landscaping and many more.

One of the most important stages was to collect accurate data, the total number of questionnaires sent was and the number of responses received and validated. This figure is greater than the required sample size, so the data obtained satisfies the quality requirements. The results of the survey were synthesized by the author and evaluated the impact, which are divided into seven groups of factors affecting the labour productivity of construction workers on sites in as follows.

Ranking of factors on workers themselves

Factors	RII	Impact	Ranking
Experience of workers	4.29	Very high	5
Labour Discipline	4.12	Very high	5
Physical ability	4.01	High	4
Psychophysiology ability	3.78	High	4
Labour Intensity	3.52	Mid	3
Age	3.41	Low	2
Gender	3.19	Extreme Low	1
Level of training	3.09	Extreme Low	1

The lower the labour intensity, the lower the labour productivity, the physiological psychological problems of people will affect the efficiency of work thus affecting the labour productivity. The higher the age, the more accumulated experience, but the physical strength can be reduced, thus greatly affecting labour productivity.

Ranking of operational and managerial factors

Factors	RII	Impact	Rank
Ability to organize	4.23	Very high	5
Production			
Construction supervision	4.20	High	4
Application of technology	3.92	Mid	3
Workers' arrangement	3.73	Low	2
Labours Communication	2.89	Extreme low	1

Ranking of factors that motivate employees

Sr. No.	Questions	YES%	NO%	Other%	Total
1	Have you heard about Construction Waste management?	80	20	0	100
2	Are you aware of waste management in your area?	70	25	5	100
3	Do you ever noticed Construction waste in the road, public area and Land?	97.5	0	7.5	100
4	In India, Do you think Construction waste management is good?	42.5	57.5	0	100
5	Do you know India recycle just one per cent of its construction and demolition waste?	80	40	0	100
6	Do you think Construction waste management is necessary?	90	0	10	100
7	Will you know construction waste management rule is mention from ministry of environment?	25	67.5	7.5	100
8	Have you ever heard about the importance of recycling in construction industry?	40	47.5	12.5	100
9	Do you use construction waste management system on your site?	35	52.5	12.5	100
10	Have you use any method for waste disposal or Recycling material?	60	32.5	7.5	100
11	Does it effect on quality using recycled material?	40	55	5	100
12	Does cost-benefit analysis affect the project cost?	42.5	57.5	0	100
13	Do you think there is enough information about the environmental impact due to Construction waste?	20	70	10	100
14	Do you think Construction and demolishing waste management has impact on sustainable development?	87.5	0	12.5	100
15	Can you say that to increase project productivity by reducing and eliminating the wastes?	82.5	12.5	5	100
16	Do you think by decreasing waste we can decrease the project cost?	82.5	10	7.5	100
17	Do you think using recycle material benefit the total project cost?	85	0	15	100
18	Have construction waste management have effect on project cost?	65	22.5	12.5	100
19	Do you think most environmental issues in India could be minimized if Construction Waste is managed properly?	80	15	5	100
20	Do you think Cost-benefit analysis should be done before starting construction?	62.5	37.5	0	100
21	Do you think by using automation technique wastages of material is decreased?	67.5	22.5	10	100
22	Do you use new technology for construction of building?	42.5	57.5	0	100
23	Is that affect in reducing wastages?	80	20	0	100
24	By giving proper training to mason increase the productivity of work and decrease the wastages of material?	62.5	25	12.5	100
25	Not following construction step induced rework and that also increase construction waste?	62.5	12.5	25	100
26	Does electrical and plumbing work increase the rework?	67.5	20	12.5	100
27	By proper storage of material on site reduced the wastages of material?	80	10	10	100
28	Do you think main reason of steel waste is because of irresponsible beam reinforcement and fabrication cutting?	72.5	20	8.5	100
29	Do you think using BIM over traditional method decreased the waste of material?	80	15	5	100
30	Now, do you use Construction waste management system on your site to increase the productivity and decreasing the cost of project?	100	0	0	100

Sr. No.	Questions	N	Nn	Max	Mean	Standard deviation	Variance
1	Have you heard about Construction Waste management?	40	1	2	12	0.405	0.84
2	Are you aware of waste management in your area?	40	1	3	14	0.580	0.336
3	Do you ever noticed Construction waste in the road, public area and Land?	40	1	3	11	0.376	0.1
4	In India, Do you think Construction waste management is good?	40	1	3	17	0.716	0.512
5	Do you know India recycle just one per cent of its construction and demolition waste?	40	1	2	14	0.486	0.248
6	Do you think Construction waste management is necessary?	40	1	3	12	0.608	0.369
7	Will you know construction waste management rule is mention from ministry of environment?	40	1	3	18	0.549	0.302
8	Have you ever heard about the importance of recycling in construction industry?	40	1	3	17	0.679	0.461
9	Do you use construction waste management system on your site?	40	1	3	16	0.660	0.435
10	Have you use any method for waste disposal or Recycling material?	40	1	3	15	0.640	0.41
11	Does it effect on quality using recycled material?	40	1	3	17	0.580	0.336
12	Does cost-benefit analysis affect the project cost?	40	1	3	11	0.379	0.144
13	Do you think there is enough information about the environmental impact due to Construction waste?	40	1	3	19	0.645	0.287
14	Do you think Construction and demolishing waste management has impact on sustainable development?	40	1	3	13	0.673	0.448
15	Can you say that to increase project productivity by reducing and eliminating the wastes?	40	1	3	12	0.530	0.281
16	Do you think by decreasing waste we can decrease the project cost?	40	1	3	13	0.588	0.346
17	Do you think using recycle material benefit the total project cost?	40	1	3	13	0.723	0.523
18	Have construction waste management have effect on project cost?	40	1	3	15	0.716	0.512
19	Do you think most environmental issues in India could be minimized if Construction Waste is managed properly?	40	1	3	13	0.543	0.295
20	Do you think Cost-benefit analysis should be done before starting construction?	40	1	3	17	0.687	0.472
21	Do you think by using automation technique wastages of material is decreased?	40	1	3	14	0.675	0.458
22	Do you use new technology for construction of building?	40	1	3	16	0.545	0.297
23	Is that affect in reducing wastages?	40	1	2	12	0.405	0.84
24	By giving proper training to mason increase the productivity of work and decrease the wastages of material?	40	1	3	15	0.716	0.512
25	Not following construction step induced rework and that also increase construction waste?	40	1	3	16	0.668	0.753
26	Does electrical and plumbing work increase the rework?	40	1	3	15	0.714	0.51
27	By proper storage of material on site reduced the wastages of material?	40	1	3	13	0.648	0.421
28	Do you think main reason of steel waste is because of irresponsible beam reinforcement and fabrication cutting?	40	1	3	15	0.783	0.613
29	Do you think using BIM over traditional method decreased the waste of material?	40	1	3	15	0.716	0.512
30	Now, do you use Construction waste management system on your site to increase the productivity and decreasing the cost of project?	40	1	1	10	0.000	0

Double-Blind Peer Reviewed Refereed Open Access International Journal

Factors	RII	Impact	Ranking
Types of salary payment	4.27	Very high	5
Staff Support	4.05	High	4
Reward Mechanism	3.69	High	4
Spiritual Life	3.58	Mid	3
Training and improving skills	3.32	Low	2
Initiative at work	3.18	Extreme low	1

Professional training, skills upgrading and innovations in labour are factors that have high impact on labour productivity. These factors directly influence the motivation of employees, bring satisfaction and sense of responsibility of construction workers to the work

Ranking of factors of working tools and object

High-impact factor is the complexity of the work with RII = 3.78 and factor of material transport methods with RII = 3.22. These factors affect the performance of the work that will also affect labour productivity as reported. In order to ensure the achievement and growth of labour productivity, organizations need to utilize machines, equipment and tools which must be suitable with products and technologies; ensure routine readiness and operation throughout the working shift; ensure raw materials, semi-finished products putting into production must have evident origin and qualification.

Ranking of natural environmental factors

Factors	RII	Impact	Ranking
Weather conditions	4.82	Very High	5
Regulations,	3.42	High	4
Geological and hydrological conditions	3.27	Mid	3
laws on construction	3.12	Low	2
	3.02	Extreme Low	1

Weather factor is a factor that has a high impact on labour productivity and is ranked first with RII of 3.82. Most construction works are built in natural spaces, where are affected directly by the weather. The weather not supporting or sometimes becoming severe has a not small impact on labour productivity. The role of natural conditions for labour productivity is objective and unavoidable. Therefore, to ensure the achievement and increase productivity, construction firms need to anticipate the difficulties arising due to natural environment conditions to mitigate risks in the production process. The second most influential factor is the factor of regulations on construction with RII = 3.42. Regulations and national policies that influence the goals and direction of the production of the construction firms, affecting the organizational

policies for workers on wages, investment in science and technology, so on, thus affecting productivity.

TESTING RESULTS & DISCUSSION

Experimental Determination of material properties

Various tests will be carried out on the materials used in Waste tyre rubber bitumen. The following tests will be carried out on materials:

Factors	RII	Impact	Ranking
Quality of materials	4.25	Very High	5
Quality of working tools	4.01	High	4
Complexity of works	3.72	Low	2
Material transport methods	3.02	Extreme Low	1

1) Bitumen with Partial Replacement with Waste Plastic

- Standard Penetration Test [IS: 73 (1950-62-92)]
- Softening Point Test [IS: 73 (1950-62-92)]
- Ductility Test [IS: 73 (1950-62-92)]
- Stripping Value Test [IS: 73 (1950-62-92)]
- Marshall Stability Test [IS: 73 (1950-62-92)] (For bituminous mix containing both Waste plastic and Reclaimed Asphalt Pavement)

2) Fine Aggregate and Coarse Aggregate with Partial Replacement of Reclaimed Asphalt Pavement

- Flakiness Index [IS 2386]
- Elongation Index [IS 2386]
- Impact Value [IS 2386]
- Sieve size analysis [IS 2386]
- Specific Gravity [IS 2386]
- Water Absorption Test (%) [IS 2386]

These all testing will be done for all the design mix to determine the mechanical properties and durability of the specimens and Results will be find out for all the tests of all design mix and it will be compare.

Properties of Bitumen

Properties	Bitumen Grade 60/70
Penetration	63
Softening Point	62 C
Ductility	64.5mm

1. For various Tests for Bitumen Replaced by Waste Plastic

Waste Plastic in Percentage of Weight of bitumen	0%	5%	10%	15%	20%	25%	Total No. of Samples
Standard Penetration Test	1	1	1	1	1	1	5
Softening Point Test	1	1	1	1	1	1	5
Ductility Test	1	1	1	1	1	1	5

2. For various Tests for NA Replaced by Reclaimed Asphalt Pavement

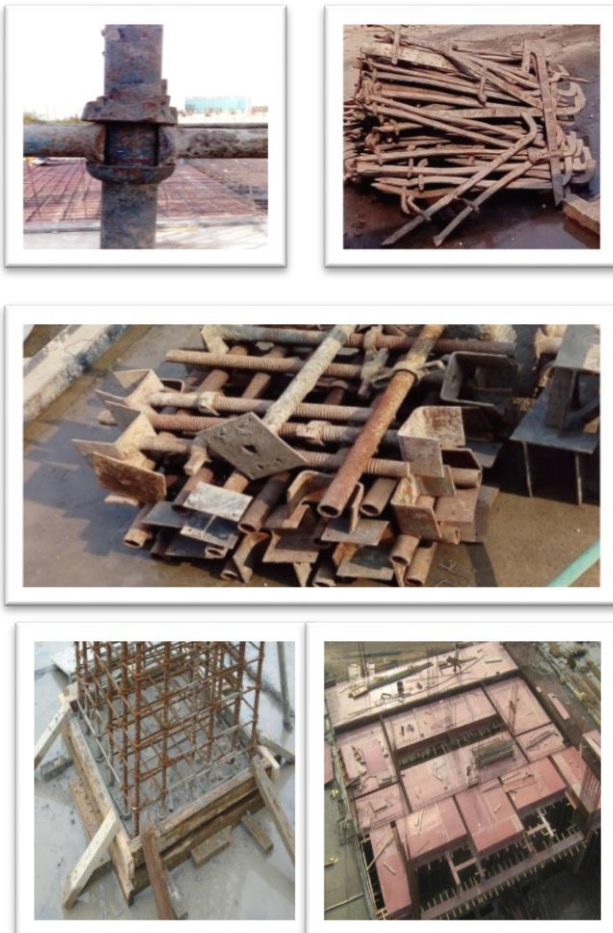
Weight of RAP in percentage of weight of Natural aggregate	0%	10%	20%	30%	40%	50%	Total No. of Samples
Flakiness and Elongation Index	1	1	1	1	1	1	5
Sieve Analysis	1	1	1	1	1	1	5
Specific Gravity	1	1	1	1	1	1	5
Water Absorption Test	1	1	1	1	1	1	5
Impact Value Test	1	1	1	1	1	1	5
Crushing Value Test	1	1	1	1	1	1	5



3. For Marshall Stability Test

Waste Plastic	0%	5%	10%	15%	20%	25%
RAP	No. of Samples					
0%	3	3	3	3	3	3
10%	3	3	3	3	3	3
20%	3	3	3	3	3	3
30%	3	3	3	3	3	3
40%	3	3	3	3	3	3
50%	3	3	3	3	3	3

SITE PHOTOS



CONCLUSION

In conclusion, planning and scheduling construction projects is very crucial in order to avoid project delays and cost overruns. So, the progress and completion of the construction project during the whole period of working will depend on how effective is the manager's schedule. The more detailed and clear the plan, the better and more understandable it will be.

- Identify project team roles and methods of project conflict resolution
- Plan and estimate percent complete for schedule and budget management
- Identify methods for schedule compression or recovery of time
- Develop risk management plans
- Identify methods for budget and scheduling estimates
- Develop a resource histogram and balance resources
- Perform earned value analysis on an actively tracked project plan

Acknowledgment

We express our sincere thanks to Project Guide Prof. Pooja Bhosale for his continuous support. We also thankful to our Head of Department of Civil..... For support

REFERENCES

- [1]. Castro-Lacouture, Daniel, et al. "Construction project scheduling with time, cost, and material restrictions using fuzzy mathematical models and critical path method." *Journal of Construction Engineering and Management* 135.10 (2019): 1096-1104.
- [2]. Munns, A. K., and Bassam F. Bjeirmi. "The role of project management in achieving project success." *International journal of project management* 14.2 (2016): 81-87.
- [3]. Suárez-Barraza, Manuel F., and Juan Ramis-Pujol. "Implementation of Lean-Kaizen in the human resource service process: a case study in a Mexican public service organisation." *Journal of Manufacturing Technology Management* 21.3 (2018): 388-410.
- [4]. Assaf, Sadi A., Mohammed Al-Khalil, and Muhammad Al-Hazmi. "Causes of delay in large building construction

Double-Blind Peer Reviewed Refereed Open Access International Journal

- projects." Journal of management in engineering 11.2 (2017): 45-50
- [5]. DeeptiSahu and A. K Jain "Resource Planning of a Colony Project Using Primavera", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 6, Issue 1, January 2017.
- [6]. AkashRajkumar Wadhwa and DattatraySantram Shinde, "Project Management Using Primavera P6 8.2", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 3, Issue 11, Nov-2016
- [7]. SushantPradhan, Rajendra S and Vijay K, "Planning, Scheduling and Resource Optimization of Multiple Projects Using Oracle Primavera P6", International Journal of Research in Engineering and Technology, Vol 5, Issue 6, June-2016.
- [8]. Shaik Mohammad Masood, Devanand. R and Harsha H. N, "An analysis on Resource Planning, Cost Estimation and Tracking of Project by Earned Value Management", International journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Issue 4, October-2014.
- [9]. T. Subramani, A Sarkunam and J. Jayalaxmi, "Planning and Scheduling of High Rise Building Using Primavera", Journal of Engineering and Research Applications, Vol.4, Issue 6, pp.134-144, June 2014.
- [10]. Satinder Chopra and ArvindDewangan, "Developing an Efficient Scheduling in Primavera P6: Significance of Activity ID & Descriptions", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 3, Issue 7, July-2014.
- [11]. Abbas M Abd and Suhad M Abd, "Resources Sustainability Planning Model Using Hierarchical Approach for Construction Project", Diyala Journal of Engineering Sciences, Vol. 05, No. 02, pp. 1-19, Dec-2012.
- [12]. Aftab Hameed Memon and Rosli Mohammad Zin, "Resource-Driven Scheduling Implementation in Malaysian Construction Industry", International Journal of Sustainable Construction Engineering & Technology, Vol. 1, No 2, December 2010.
- [13]. Safw Kawa Abdulkareem, January 2020, Methods of Project Planning for Construction Projects, Research Gate
- [14]. Meharan Barani Shikrobat, Shabnam kabiri, Roger Flanagan, December 2019, project planning and scheduling, Research Gate
- [15]. Kerzner H (2016) Project management: a systems approach to planning, scheduling, and controlling. Wiley, New York,
- [16]. Meredith J, Mantel S (2018) Project management: a managerial approach, 6th edn. Wiley, New York,
- [17]. Moder J, Phillips CR, Davis EW (2014) Project management with CPM, PERT, and precedence diagramming, 3rd edn. Van Nostrand Reinhold, New York,
- [18]. Associated General Contractors of America (2015) Construction estimating & bidding: theory/principles/process. AGC of America, Arlington,
- [19]. Patrick C (2018) Construction project planning and scheduling. Pearson Prentice Hall, Upper Saddle River