

Planning for Resource Management with Maximum Efficiency

HariPriya M

India

Abstract: To finish the project within the allotted time and budget, it is crucial to plan the management of resources effectively. It is crucial to finish the project within the committed date of project handover and at an economical cost in today's situation where the cost of resources is increasing due to inflation. Many projects fail to reach completion because investors lose interest because the project is either too costly or too late for them to acquire their share. As a result, establishing an Efficient Plan for Site Resource Management is crucial for preventing any such circumstance. Effective Resource Management Planning on the Job Site is Demonstrated in This Study. All the resources used to finish the site are categorized into four main areas in this study: material, human resources, finances, and plants, tools, equipment, and machinery. In this research, we found that when individuals' resources are well-planned, it leads to better overall resource management, which in turn helps those working in the construction industry meet their project completion goals on time. The resources used to build a G+3 residential building and the construction site itself are the subjects of a case study that lend credence to this result.

Keywords: Tools, equipment, machinery, plants, human labor, human resource planning, economics, management, and cost-effectiveness

Introduction

At its core, the construction industry in the United States is a service sector. It entails having an architect create a detailed blueprint and then having an engineer turn it into a completed project. A company's capacity to successfully bond the resources needed to complete a project is crucial to its success in the construction industry.

The term "resource handling" refers to the process of organizing the financial backing, human capital, raw materials, tools, and machinery needed to finish a construction project. If the resources are not managed properly, the project might not be completed within the allotted time and profit margin. Therefore, it requires the utmost care, significance, and attention.

There is no tried-and-true technique to overcome the difficulty of managing resources, which is exacerbated by the fact that each project is unique. A thorough and research-based examination of the practical experience of each former project is the only way to get a better understanding of resource management, which requires a high degree of planning and monitoring.

Observation in the Above Discussed Literature Review:- In the above discussed Paper Presentation it has been observed that all the above studies are related to Individual Resources. Whereas in a Site, to actually Efficient Planning of Resource Management, All the types of Resources needs to be discussed with mutual link which has been provided in this Case Study.

Also some of the points missing in the above paper presentations have been discussed in this Paper Presentation.

It was observed in the above Studies that Major Focus is provided on Direct Cost, whereas in Site It has been seen that Mostly it is Indirect Cost, which is actually responsible for increasing the Total Cost of the Project. In this Presentation we have tried to emphasize even on Indirect Costs. It was also observed that in the discussion of Efficient Human Resource planning only Site workers are taken into consideration such as Fitters, Helpers, and Carpenters etc. But in this Paper Presentation, even Workers working in Offices as Staff Workers are also taken in account. As it is observed that in the Reason for a Site to execute its operation in delay because of lack of human resources, Both Staff Workers and Ground Labours are included.

Objective

Objective of Effective Planning of Resource Management in Construction Industry is to complete the project within an economical cost and at the same time to fulfill all the guidelines of quality standards within the given target time.

An Efficient Implementation of Effective Planning of Resource Management enables smooth completion of the project without any obstacle.

Main Objective of Efficient Management of Resources is to provide sufficient quantity of resources within the given time as estimated during the planning stage.

Other Objectives are as follows. (a) To ensure Resources availability throughout the duration of the Project and to resolve conflicts related to absence or insufficient amount of resources. (b) Optimize time, effort and cost. (c) To ensure that the project is provided with adequate number of human workers having right amount of skill in them. (d) To reallocate resources as per the demands of the special conditions. (e) To effectively track resources utilization in order to avoid conditions where resources are consumed more or less than the planned both which are not in the benefit of the Project

Scope

The success of any project depends upon the optimum utilization of the resources involved in its construction which is only possible when the project gets completed within the given time. It is because every activity in a Construction Project requires both resources and time for its completion. And If an Activity utilizes resources and time more than the planned, it results into the delay of the Entire Project which is known as **Project overrun**.

In Developing Nations, Project overrun is a very serious problem where implementation of project faces many uncertainties. It results in wastage of costly and limited available resources and delays in providing facilities and development and also makes the overall construction activity very costly. In present scenario with the help of advance Technology, there is a great requirement of having a scientific and systematic approach to solve the project management related issues so that the project is completed within given time and cost and thus, this is where **Effective Management of Resources** comes into place. Definition

Effective Planning of Resources is defined as the process of planning of the resources which are necessary to meet the requirements of the project as per the given planned schedule so that the given project is completed within the given duration.

Without proper Resource Management, Project can take completion time ahead of the scheduled time which can make the overall Project unprofitable and hence there are chances that a Project can be left incomplete due to the above reason.

1. Methodology

In a Construction Project, Effective Planning of Resource Management is done under following Main Four Categories.

- A) Effective Planning of Material Management
- B) Effective Planning of Human Resources Management
- C) Effective Planning of Financial Management
- D) Effective Planning of Tools, Equipments, Machineries and Plant Management.

(A) **Effective Planning of Material Management:** - It is done in following stages.

- (a) **Selection of the Type of Material:-** Depending upon the specifications laid, Quantity Estimation of the Material and Cost Analysis of the Material - It involves proper planning of Materials required in the Construction Project which involves detailed and accurate Quantity surveying of Materials and Cost Analysis of the Material by Quantity Surveying Engineers and placing the requirement as per the plan schedule of the project and forwarding the Entire Sheet to the Purchase Department.
- (b) **Scheduling, Purchasing and Procurement:** – In this Stage a schedule is prepared known as Material Planning Schedule. On the basis of this Schedule, the Purchase Department in turn starts purchasing the materials from the market through the vendors 3month in advance by inviting quotations from them and selects the less but economical Quotation and then purchase the material through the vendor who's Quotation has been successfully accepted.
- (c) **Receiving of Materials in Site and Entry of Materials in Record Books or Register maintained on Site:** – Here Materials are received on Site when along with Materials; Three types of documents are received on Site. These three documents are copy of purchase order, Suppliers advice statement and Consignment Note. At the same time care should be taken that Materials should be properly inspected quantity wise, quality wise and specifications wise before taking them into account in official record books.



- (d) **Stacking of Material in Store House, Material Issue and Utilization of Material** – Here, Materials entry is done in the Records Books of Store House and Materials are stored in the pre designated stacking with proper labeling. Materials are then delivered to the Actual Site on the basis of request Material Slip issued by the Site in Charge, Which is also kept in separate Record. This helps in proper tracking of Quantity of Materials dispatched on Site.
- (e) **Waste Management and Reconciliation Management** – In this stage a record is kept on wastage and scrap Material produced on site. Based upon the Inventory Record, Material Issue Record and Wastage Record Reconciliation Statement of Each Material is prepared at a interval of 3 Month
- (B) **Effective Planning of Human Resources Management:** It is done in following stages.
- (1) **Updating the Requirement of Manpower by the Site Management to the HR Department or Top Management Periodic Wise :-** In order to have Regular update about the Requirement of Manpower, The Site Management or the Concerned HR Department needs to have update three Parallel Records which are
First – Existing Manpower allotted on the Site for each individual activity.
Second – Workforce Labour Efficiency of every activity done on the Site.
Third – Duration of each activity to be done on the Site.
Requirement of Man power required on Site can be calculated from the following formula.
If A = Workforce Labour Efficiency of a given individual activity and B = Duration of the activity, then C = Man power requirement = $A \times B$.
- (2) **Recruitment based on Job Analysis** – In this Phase, Skills required by a labour for doing a particular job are analyzed and are listed out. And at the same, the the skills required are converted as parameters for the selection of a particular candidate for a given job.
- (3) **Training, Skills Test Programme and Appraisal** – In this phase, Labours should be subjected to skills training program annually and based upon their performance in the Skills Training Programme, they should be awarded with appraisals accordingly.
- (C) **Effective Planning of Financial Management:** - To effectively arrange Finance required for the Finance Management, the Site Management should have a proper estimated sheet for Costs both Direct Cost and Indirect Cost Month wise throughout the duration of the Project. Here Direct Cost includes Labour Cost, Material Cost, Equipment Cost, Transportation Cost etc and Indirect Cost includes Expenses that has to be spend on Maintenance, Repairing, Administration and other activities etc.

Following are three points which the Site People should take in care for having a Cost Effective Finance Management – Controlled Expenditure related to IndirectCost, Minimum Instances of Missing the Deadlines such as Submission of Invoice, Payment of Bills, Clearance of Taxes, Dues etc. and Effective and Efficient use of Resources with least amount of wastage.

(D) **Effective Planning of Tools, Equipments, Machineries and Plant Management :-** Basic aim of Tools, Equipment, Machineries and Plant Management is to provide the right equipment at the right time and place so that the output work can be achieved with minimum cost and maximum production.

- (1) **Selection of the Equipment:** - The Concerned officer in Charge should have a updated record of all the equipment available, in the market as well as the latest equipment launched in the market. He should be readily available with the information such as productivity efficiency Maintenance and Repairing Cost and also the contact no of dealers through which the given equipment can be purchased at a economical cost. At the same time, the Project Manager should also make available the working conditions on the site to satisfy which equipment is required.
- (2) **Equipment Hiring Process:** - It has to be done keeping in mind, the output efficiency of the equipment, the no of times equipment can be repeatedly used on other construction sites, economic life of the equipment and the depreciation of the equipment.

It can be calculated from the Following Formula.

If **A** = Capital required for a Equipment, **B** = Maintenance and Repairing Cost of the Equipment, **C** = Fuel Cost and Driver Salary Reimbursement & **D** = Depreciation Cost

Then **A = B + C + D.**

- (3) **Equipment Operation and Maintenance** :- Here routine policies of maintenance and operation and updating the operator of techniques of using the machine needs to be prepared and followed Periodically at equal interval of couple of months. This prevents loss of money and time due to sudden break down of the machine and the transportation of the machine to the workshop dealer.
- (4) **Equipment Documentation Record** : - It includes, Entry of the Equipment in the official records of the Site. It includes a separate Record for each equipment where on every day basis, the operating hours of the equipment are recorded, the maintenance and repair expenditure are recorded in order to determine the Depreciation accruing over a equipment and also to decide the time or period when the existing equipment is to be replaced by the new equipment In order to have.
- (5) **Replacement of the Old Equipment by the New Equipment and Scrap or Resale of the Old Equipment** : - It is decided keeping in mind parameters like downtime cost, depreciation cost and obsolescence cost. To decide the time of Replacement, the working hour's record and the Maintenance and Repairing Records needs to be properly updated and reviewed. And if a equipment has to be replaced, information of the needs to be given to the Purchase Department or Project Manager in advance period of 2 months. So that within the given period, the Purchase Department can start hiring a new equipment in order to replace the old equipment and at the same time can find a buyer to whom they can resale the old equipment. As compared selling the equipment in Scrap, if the Company resale the old equipment, It gets a good price for the equipment.

Project Details

- (1) Name of the Project – Construction of a G+3 Residential Building.
- (2) Built up Area – 207 sqm.
- (3) Number of Storey's – G+3.
- (4) Floor to Floor Height – 3.2 m.
- (5) Height of Plinth – 0.5 m above the Ground Level.
- (6) Depth of Foundation – 1.5 m below the Ground Level.
- (7) External Walls – 250 mm thick including plaster.
- (8) Internal Walls – 150 mm thick including plaster.
- (9) Parapet Walls – 250 mm thick including plaster.

2. Result and Analysis

For efficient planning of Resources Management, Following Information is required regarding every activity in any given construction project. **(a)** Type of Activity. **(b)** Start date, duration and finishing date of the activity. **(c)** Type of Resources required and its estimated amount. **(d)** Source of each Resource required in the activity. **(e)** Tools, Equipments and Machineries required in the activity. **(f)** Cost estimates regarding the Purchase, Transportation and Processing of each Material Resources required in the Activity and the Amount of Human Worker and its Cost should be already prepared during the planning stage and should be available at the execution stage in order for Proper Tracking.Summary

A successful Effective Planning of Resources Management requires Implementations of Following Points. **(a)** Access to the updated plan with clear definition of the different phases of work and activity scheduling. **(b)** Knowledge about the type of resources those are required.

(c) Knowledge about the available quantity and optimum consumption of the resources. **(d)** Knowledge of the newly invented materials and Techniques or the latest arrived in the market whose purchasing, transportation and processing or in simple words utilization cost is less than the Consumption cost of the present materials or old materials. **(e)** Knowledge of the lead time required in order to ensure that resources are already available at the time of their utilization as required in the planning stage of a given activity in a project. **(f)** Knowledge of providing extra resources to a particular activity of a Construction Project in order to accelerate its rate of completion and complete

the given activity ahead of its completion date as provided during the planning stage of the Project.

Acknowledgment

Here I would want to express my gratitude to everyone who assisted me in carrying out this study. My deepest gratitude goes go to my project manager. Thank you to Bikram Prasad Sir, Head of the Civil Engineering Department, and Sandeep Gupta Sir, Sagar

Institute of Research, Technology, and Excellence, for all of their support and assistance during the project.

References

- [1] The article "Resource Management in Construction Projects" was written by SK Nakaraju, B. Sivakonda Reddy, and Prof. A. Roy Chaudari in 2012 and published in the International Journal of Engineering Science and Technology (ESTIJ), volume 2, issue 4, with the ISSN number 2250-3498.
Article titled "Finance Planning in Construction Project" published in the International Research Journal of Engineering and Technology (IRJET) in June 2016 by Nikhil D. Shinde and Prof. M. D. Mata (e-ISSN: 2395-0056, p-ISSN: 2395-0072).
The paper "Construction Materials Management on Project Sites" was presented at the 2011 National Conference on Recent Trends in Engineering and Technology by Khyomesh V Patel and Prof. Chetna M. Vyas at B.V.M Engineering College in V. V. Nagar, Gujarat, India.
- [4] "Management of Equipment and Machinery in Construction" by Prajesh V.P. and Mr. N. Sakthivel (2016) Published in May 2016, Volume 3, Issue 5, by the International Journal of Innovative Science, Engineering, and Technology (IJISSET), with the ISSN number 2348-7968.
The article "Causes and Effects of Delay in Indian Engineering Projects" was published in the International Research Journal of Engineering and Technology (IRJET) in April 2016. The article may be found online with the DOI number 2395-0056 and printed with the ISBN number 2395-0072.
In their 2013 paper "Plant and Equipment Management to Minimize Delays in Road Construction Projects," Sri Nuwan Randunupura and Chandanie Hadiwattege of Sri Lanka's Department of Building Economics presented their findings at the Second World Construction Symposium 2013: Socio-Economic Sustainability in Construction, held in Colombo, Sri Lanka, from June 14th to June 15th.
- [7] "Construction Cost Analysis and its Importance to the Economy" (Research Paper No. 35-42 in Procedia Economics and Finance, Volume 34, 2015) by Renata Stasiak-Betlejewska and Marek Potkańy, published in Business Economics and Management 2015 (BEM2015)