

Effective Resource Utilization for Successful Completion of a Project in Nepal

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Abstract: Construction projects require planning, scheduling and resource management for successful completion of a project. Improper planning, poor estimation and unclear contracts regarding the procurement of resources cause cost and time overrun in activities of a project. So, a resource must be planned with proper estimation, clear contract and smooth utilization of resource constraints. The present study deals with the resource management of two projects namely “Khudi Hydropower Repair Project” and “K.C. Bhawan Semi-Commercial Building Project” in Nepal. The study for this project has been carried out in two stages. At first all the activities were planned and scheduled in Microsoft Project then the resources for each activity were planned and estimated using MS Excel in the second stage. The prices attributed for the Commercial Building was adopted using the Standards prevailing in the market and for the repair of hydropower project, prices are adopted according to the BOQ as agreed between the client and contractor. The study of this paper relates to two prevailing contracts in the market where one contract gives the authority of managing the resources by the contractor itself while the other contract gives the authority of managing resources by the client. The required data has been collected from drawings and prevailing site conditions which has shown that contracts giving authority of managing resources to the contractor is more cost effective than the contracts where resources are procured by the client itself. The study of this paper also concludes that material price forecasting is required as the contractor suffered a loss in the fourth floor of the building. The material price attributed to the fourth floor was taken by taking the average of the material prices of the previous five years.

Keywords: Microsoft Project, MS Excel, Resource Constraints

1. Introduction

In general, Construction industry in Nepal has mostly failed to achieve its goals which has given rise to dissatisfaction to all the parties involved in the construction. Time and cost overrun are common due to difficulties in management of resource as Nepal is a mountainous country with high terrain which poses difficulties in transportation of resources required for the project. The average delay in implementation of a project is about three years.

This clearly depicts the situation that poor resource management in construction industry exists in Nepal and there exist the necessity for proper management of these resources for the successful completion of these projects within the prescribed budget and time.

One of the major factors for improper resource management in Nepal is due to the contract relating to the procurement and management of resources done between client and contractor. There exist two types of contract in Nepal where resources are procured and managed by either client or contractor. So, this project focuses on the better and efficient type of contract needed for smooth management of resources by comparing the results of both type of contract. “Khudi Hydropower Repair project” is a completed project so as to verify the results whereas “K.C. Bhawan Building Project” is an ongoing project where case study is carried out so as to know which form of contract is better for efficient management of resources for the successful completion of the project.

2. Resource Management

Resources are materials, energy, services, staff, knowledge, or other assets that are transformed to produce benefit in the process may be consumed or made unavailable. A resource in construction is usually classified into six categories which are classified as Products and materials, Construction plant, tools and equipment, Human resources, Space and facilities, Sub contractors, Finance.

A. Importance of Resource in Construction Project

Resource is one of the major factors that leads to successful, profitable and smooth operation of a project. All activities are associated with some certain resource. So, a project manager must be clear about the resource required and available for completing a certain activity. Unavailability of resource during the execution of a certain activity can lead a project to time overrun. So, the project ultimately leads to cost overrun since cost and time are interrelated and directly proportional. So, with the proper resource allocation, resource leveling and proper judgement of interdependencies between the resources, a project can be completed within the framed budget and time.

B. Methodology Adopted

This paper mainly focuses on the effective utilization of resources by scheduling the activities, preparing a grant chart, estimating the resource required for completing each activity and then allocating the resource by leveling all the resource required. At first phase the schedules are prepared in MS project and then resources are allocated and leveled. In the second phase, the resources are estimated using Ms Excel and quantities required for each activity is known. In the third phase resource attributes between the projects are compared.

3. Project Attributes

A. Project Details

Name of the project: Khudi Hydropower Repair Project
 Built up area: 4415.33 sq. feet
 Depth of Foundation: 0.5 m above ground level
 Dimension of base footing: 0.5m * 1.5m
 Dimension of Wall: 1.5m * 0.5m
 Estimated Cost of project: Rs. 9104260
 Actual Cost of Project: Rs. 8243048
 Estimated time of project: 90 Days
 Actual time of project: 73 Days

Name of the project: K.C. Bhawan Semi-Commercial Building
 Built up area: 6661.06 sq ft
 Number of Storey's: 5
 Floor to Floor Height: 10 Ft
 Height of plinth: 7 ft
 Depth of Foundation: 6 ft below ground level
 External Wall: 9 inch
 Internal Wall: 4.5 inch
 Parapet Wall: 18 inch
 Estimated time of project: 238 days
 Estimated cost of project (without procurement): Rs. 26100504
 Estimated cost of project (with procurement): Rs. 24270540

B. Preparation of Estimates

The estimates were prepared for the individual activity of the project by studying the drawings and materials required for completion of a project. This includes number of bags of cement, quantities of sand, aggregate, formwork, tiles, bricks etc required for completion of the project. In the case of hydropower project manpower cost is calculated on the basis of contract done between Contractor and Sub contractor. The calculation is done on the basis of volume worked by the workers. For the building project, the sub contractor has an agreement of RS.400 per square feet which is calculated by measuring the length and breadth of slab. The electrical works, plumbing works and furniture works are calculated on the basis of contract done between client and contractor.

C. Project Scheduling

The scheduling of activities is done in two ways. In the first project concerning hydropower, the activities are scheduled according to the practical scenario. Whereas for building case, the activities are scheduled for the first three months on the actual scenario while others are predicted taking the suggestion from experts and the contractor itself who had an experience of 15 years in the field of building construction only. The building project was scheduled in such a way as the project is under construction phase. The activities can be seen in Grant Chart where at first resource allocation is done to each activity and then scheduled. The total duration for both the project is calculated by resource leveling required for each activity in the grant chart.

D. Project Cost

The hydropower project cost has been calculated by using the data of expenses in real field. The estimated amount of this project is taken from BOQ. The resources are not estimated instead the real field data are used instead. In the case of building construction, the project cost has been estimated as this is a running project. The manpower cost, plumbing cost and the electrical cost are attributed to the

project by the agreement between the client and different contractors.

4. Resource Constraint Analysis

The resources quantities are analyzed through drawings and then calculated using the standard formula through excel. The volume of resources required for each activity is accessed and the amount required to purchase the resources are also indicated in the MS Excel. The resources are also leveled in MSP indicating the resource, volume and amount required before initiation of any activity of the project. This is done for both the projects

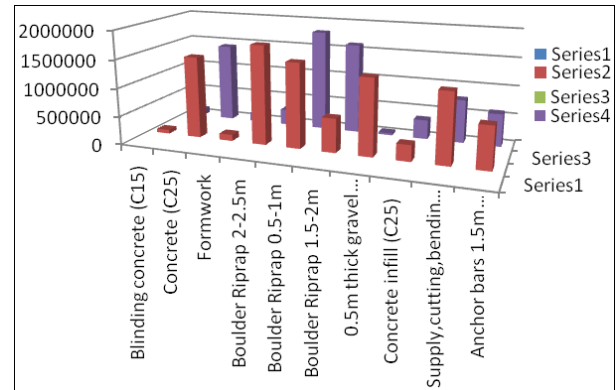


Figure: Khudi Hydropower repair project BOQ Vs Actual Expense

The graph above shows the cost required for completing each activity. In the front row the table represents the estimated cost as per BOQ. Whereas in the back row the table represents the actual cost incurred during the site execution. The overall cost of the project was estimated Rs. 9,104,260.00 according to BOQ while the actual expense of the project was Rs. 8,243,048.87 when materials was procured by the contractor. This clearly shows that resources should be managed by the contractor itself as the project becomes more profitable and cost effective.

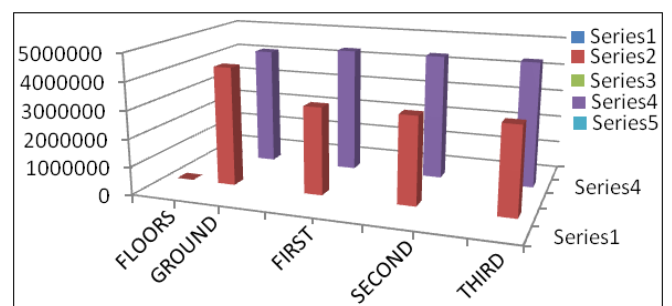


Figure: Expenses for each floor indicating the estimated and actual expense

The above figure shows the cost for each floor which have been spent on site. The front row indicates the actual amount spent on site where the procurement of resources is done by client itself. The back row indicates the standard rate for construction with the procurement of materials by the contractor itself.

The above graph indicates that in ground floor there is not much of a difference while in the first, second and third floor there's a slight difference. In the fourth floor it is opposite

where contract with material has won over contract with manpower only. This condition in the fourth floor was created since forecasting of material price was adopted for this particular floor only as it falls in the duration when taxes are increased in that particular duration. The overall cost of the project was Rs.26100504 whereas by the standard rates prevailing in the market, cost of the project would have been Rs.24270540. So, calculating the overall cost contract with procurement of materials is more profitable to the client rather than a manpower contract.

5. Conclusion

Resource is one of the major factors that are vital for successful completion of a project. So, before managing the resources, it must be clear for a project manager about the procurement authority. By this study it shows that a contract with procurement rights by a contractor is more cost effective and profitable to both client and contractor in case of Nepal.

Resources must be allocated to each activity and it must be clear for a project manager when the resources are required depending upon the activities to be performed. The missing of resources in a particular activity not only affects the activity cost and time but affects the whole project cost and time.

So, the resources must be leveled and estimated precisely so that the project is completed within time and budget.

The overall conclusion of the project is that there is increment of 9.45% when the resources are procured by client itself in the case of hydropower. In case of building construction, the increment was 7.011%. So, Taking the average of both these values we can say there will be an increment of 8.2% from the project cost when the resources are procured by client itself.

In the building case, the scenario was opposite which clearly depicts that material price forecasting is required during the contract phase. In the fourth floor the contractor would have suffered a loss if the pricing for the fourth floor was kept same as the others floors below.

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Author Profile



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