THINK INDIA JOURNAL

ISSN:0971-1260
Vol-22- Issue-14-December-2019

A Cost Control Technique For Construction Project By Using Alternate Material

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ABSTRACT

In today's competitive market in India, it is very important for projects to stay profitable as profit margins are getting smaller and smaller. Therefore cost control of projects becomes the most essential element of the projects. The success of the construction project directly depends on the how the management reduces the cost of the work. In major construction projects material management & planning is an important and complex function which needs substantial improvements. This paper reports on a study carried out to explore potential cost control of residential project using alternative material which has larger impact on the total construction cost. The literature survey and data collected from construction site has been studied to identify the way of cost control in construction project through use of different material. In this paper we focus on road construction to clear the idea if we use alternate material and method then we can save the cost of project.

Keywords— *Cost Control, Cost Control Technique, Literature Survey, Comparison of activity by alternative methods, Alternate Method.*

1. INTRODUCTION

The cost control is a process that should be continued through the construction period to ensure that the cost of the project is kept within the agreed cost limits. The cost control can divide into two major areas; the control of cost during design stages and the control of cost by the contractors once the construction of project has started. Cost control is directly linked to the project's work breakdown structure because costs for schedule activities are estimated for all resources charged to the project. The main objective of cost control of a project is to gain the maximum profit within the designated period and satisfactory quality of work.

One of the reasons why cost overrun and delays occurs in majority of construction projects in India is the absence of a good cost control mechanism for different parties involved in a project, namely the owner, the contractor and the client's consultant as well as the use of material and method to complete the project work is mainly hamper the cost overrun.The accuracy with which activity resources are estimated will largely determine the magnitude of the cost control challenge. Assured project cost estimation is essential to securing an adequate budget that, in turn, establishes the baseline that will serve as a cost control reference.

2. OBJECTIVE

To identify the various activities and resources required for carrying out the activities through literature survey. To identify the cost control methods frequently used by contractor during the construction stage. To compare the different methods for construction project without affecting quality.

ISSN:0971-1260
Vol-22- Issue-14-December-2019

3. LITERATURE SURVEY

The cost control is a process that should be continued throughout the construction period to ensure that the cost of the project is kept within the limit. All expenditure limit control must be related to the functional requirements of the particular project type.

As per Jamshid, estimation of cost for road project like highways is depends upon the proper planning and to study the feasibility of project. It is a very crucial job to accurate estimation.This paper elaborates the new methods of cost estimation like Arithmetical Neural Network method which a more accurate estimation method for highway projects in developing and developed countries at the conceptual phase. According to author lack of preliminary information, lack of database of road works costs, and lack of up to date cost estimation methods its seems major problem for cost estimation during the conceptual phase of project. So we need to minimize cost at this level.

According to Ritzcost control though namely easy, but it gives a different meaning to different people. As per some of the people cost control means engineering cost, some people states that it is a cost report, value engineering, cost management system etc. But, Cost control is the activity which involves all such kind of parameters at different time phase of project. All the stakeholders like project manager, worker, owner etc. who are involved in a project have their own responsibilities and roles in reducing and controlling the costs before project start, during project execution and at the time of project completion.

As per Kern and Fermoso, the measurements from traditional cost control systems are not linked to the goals and objectives set for each project. This is because those systems have their own internal functional operation and that they present considerable complications in adjusting to the unique and often one-off circumstances of the project.

As per W.K. tang, CostControl systems are composed of the following cost techniques:-

1) Cost Planning and Control
2) Estimating
3) Budgeting
4) Cash Flow Identification
5) Financial and Cost Reporting
6) Value Management
7) Judgment

According to Dharwadker, cost control can be achieved by selecting the exact material, manpower, methods and machinery for exact work or project so that wastages will be minimize. The project manager must have all kind of Manpower, Material, Money, Machinery and Methods with due consideration to the quality of work, yet within the estimated cost and limits for cost control.

According to George Otim et al. the construction industries suffered from cost and time overruns during the design and project implementation stages. The author was identified commonly used cost control techniques which include schedules, budget, inspection, meetings, reports, records, monitoring & evaluations. Most of higher authority on project who work on site find the difficulty in controlling project costs due to problems like delays by clients regarding money, delay to decision making, availability of materials and equipment on site will be less, bad weather condition, overlapping of activities, complex, unclear and incomplete drawings, and generally failure to control the productivity of resources.As per author following are the activity where we need to control,

Project Resources a Control—In this segment Man, Money, Material, machinery and method to complete the work is important to control the cost in infrastructure project.

Cost Control Techniques Used on Sites-- Work Programmes, Inspection of Works, Monitoring Work and Cost Performance Evaluation of Works Carried Out

As per Vacharapoom Benjaoran et.al., A cost control of a Infrastructure project is a important task which is a key to success of the business. From the survey the researcher found out that in small and medium company there is neither special department nor specialized persons available to control the project costs but usually it maintained by the company owners themselves. The researcher developed a model call as Barcode-based Cost Control System [BCCS] for the controlling of cost. So that the bills,

ISSN:0971-1260
Vol-22- Issue-14-December-2019

materials are to be managed as per records. So this is new concept in construction industries to use a barcode system to control the cost.

As per Miss. Kokate and Prof. Milind Darade, In construction sector it is usually the actual cost of project work is more than estimated cost. This type problem need to proper management, planning and control the work to resolve this type of problem, so the cost of work can control by the replacing the material by alternative material and reduces the proactive and reactive accident. As per author the cost is controlled by replacing the alternative material which can help to control the cost of construction as well as maintain the quality of construction. The author reduces the cost of project item nearly 3.5% by using alterative materials.

4. CONCEPT OF COST CONTROL

Cost control is not only overlook of costs like income and expenditures and recording data, but also analyzing the data in order to take corrective action before the loss. Cost control means good cost management, which must include:

- Cost estimating
- Cost accounting
- Project cash flow
- Company cash flow
- Direct labor costing
- Overhead rate costing

4.1 Different Cost Control Techniques

Following are the different way to control the cost,

- Cost Control by Material Management
- Cost Control by Machinery Management
- Cost control by Manpower Management
- Cost control by Method Management

4.1.1 Cost Control by Material Management

Material Management i.e. Material management is a system which ensures that right quality of material in the right quantity at the right time and right place with the right amount of investment.
For the material control following system to be used,

[1] Level setting
[2] Economic order quantity
[3] ABC analysis
[4] VED analysis
[5] Material (or inventory) cost reports

1] **Material Cost Comparative Report**

Herewith we focus a case study which uses different material for construction of road on site. We select the site of Gagan Nulife in Pune area and here we compare the techniques use for construction of road construction work with the help of different types of material. We consider 15 Meter wide and 365 Meter length road. In this comparative we focus on earthwork, roadwork, footpath, electrical services and storm water services.

ISSN:0971-1260
Vol-22- Issue-14-December-2019

Project :Gagan Nulife, Kamshet				
Trimix Road Estimate Comparison (For 15.0 mtr wide Road) From Old Mumbai Pune highway NH 48 to Gagan Nulife plot				
SR. NO.	**PARTICULARS**	**COST FOR TRIMIX ROAD**	**COST FOR BITUMEN ROAD**	**DIFF. IN COST**
A	SECTION A: EARTHWORKS	Rs. 1,672,612.50	Rs. 1,672,612.50	Rs. -
B	SECTION B: ROAD WORKS	Rs. 10,730,343.00	Rs. 8,864,025.00	Rs. 1,866,318.00
C	SECTION C: FOOTPATH / WALKWAY	Rs. 1,579,277.55	Rs. 1,579,277.55	Rs. -
D	SECTION D: ELECTRICAL SERVICES	Rs. 967,982.26	Rs. 967,982.26	Rs. -
E	SECTION E: STORM WATER SERVICES	Rs. 567,334.34	Rs. 567,334.34	Rs. -
	GRAND TOTAL (A TO E)	**Rs. 15,517,549.65**	**Rs. 13,651,231.65**	**Rs. 1,866,318.00**

Measurement Sheet For Road Project

Item No.	Description of Item	Nos.	Length (M)	Width (M)	Depth (M)	Total Qty.	Unit
A	**FORMATION / EARTHWORKS**						
1	SURFACE DRESSING	1	365	15	1	5475	SQM
2	EXCAVATION	1	365	15	1	5475	CUM
3	MURUM FILLING	1	365	15	0.3	1642.5	CUM
B	**ROAD WORKS**						
1	HARDCORE 150 MM	1	365	15	1	5475	SQM
2	WBM 75	1	365	15	1	5475	SQM
3	PCC FOR SUBBASE	1	365	15	0.075	410.625	CUM
	DEDUCTION FOR PAVING BLOCKS (CROSSINGS)	0	18	2	0.075	0	SQM
	TOTAL PCC AREA					**410.625**	**SQM**
4	M-25 TRIMIX FOR CARRIAGEWAY	1	365	15	1	5475	SQM
	DEDUCTION FOR PAVING BLOCKS (CROSSINGS)	0	18	2	1	0	SQM
	TOTAL TRIMIX AREA					**5475**	**SQM**
C	**CIVIL WORKS FOR MEDIAN PLANTER**						
1	EXCAVATION	0	365	0.75	0.3	0	CUM
2	SOLING 9" THK	0	365	0.75	1	0	SQM
3	PCC FOR BRICKWORK	0	365	0.45	0.1	0	CUM
4	9" THK. FLY ASH BBM	0	365	1	0.8	0	SQM
5	SINGLE COAT SANDFACED PLASTER MEDIAN	0	365	1	1.06	0	SQM

ISSN:0971-1260
Vol-22- Issue-14-December-2019

6	EXTERIOR ACRYLIC PAINT FOR MEDIAN PLANTER	0	365	1	1.06	0	SQM
D	**FOOTPATH / WALKWAY**						
1	EXCAVATION	2	365	0.75	0.3	164.25	CUM
2	SOLING 9" THK	2	365	0.75	1	547.5	SQM
3	PCC FOR BRICKWORK	2	365	0.3	0.1	21.9	CUM
4	6" THK BRICKWORK FOR KERBING	2	365	1	0.45	328.5	SQM
5	PAVING BLOCK FIXING FOR WALKWAY	2	365	1.5	1	1335	SQM
6	PAVING BLOCK FIXING FOR CROSSING	0	18	2	1	240	SQM
7	SINGLE COAT SANDFACED PLASTER KERBING	1	365	1	0.38	138.7	SQM
8	EXTERIOR ACRYLIC PAINT FOR MEDIAN PLANTER	1	365	1	0.38	138.7	SQM
E	**LANDSCAPE AT MEDIAN**						
1	SOIL / MANURE FILLING AT MEDIAN	0	365	1.54	0.6	0	CUM
2	SHRUB PLANTATION AT MEDIAN	0	365	1.54	1	0	SQM
F	**ELECTRICAL LIGHT FITTINGS**						
1	4" PVC PIPE CONDUIT	1	365	1	1	365	RMT
2	9" X 12" CHAMBERS FOR ELECTRICAL LINE	50	1	1	1	50	NOS
3	ELECTRICAL POLES WITH LIGHT FITTINGS	50	1	1	1	50	NOS
4	EXCAVATION FOR ELECTRICAL POLES	50	0.45	0.45	0.45	4.55625	CUM
5	CONCRETING FOR ELECTRICAL POLES FOUNDATION	50	0.45	0.45	0.45	4.55625	CUM
G	**STORM WATER SERVICES**						
1	**EARTHWORKS**						
	FOR SERVICE LINES	1	365	1.5	1.5	821.25	CUM
	FOR CHAMBERS (ROUND CHAMBER)	25	2	2	1.5	150	CUM
						971.25	CUM
2	**BACKFILLING**						
	For Stormwater Lines						
	For Stormwater Lines for Section D-10 to D-680	1	365	1.5	1.5	821.25	Cum
	Deduction	-1	365	0.2826	1	-103.149	Cum
						718.101	**Cum**
	For Chamber 0.6 x 0.6 mtr						
	Between Section D-10 to D-680	25	2.26	1.96	1.5	166.11	Cum

ISSN:0971-1260
Vol-22- Issue-14-December-2019

	Deduction	-25	1.36	1.06	1.5	-54.06	Cum
						112.05	**Cum**
	Total Backfilling					**830.151**	**Cum**
3	**STORMWATER LINE**						
	STORMWATER LINE 300 mm DIA	1	365	1	1	365	RMT
	CHAMBERS	1	25	1	1	25	NOS

The above comparative table focus on alternate technique use by construction project of road construction in Pune. On the site they are use Trimix Concrete internal road but at the same time start to use Bitumen road instead of Trimix road so they save around 18 lacks in construction of internal road. This is only one type of technique which is focusing change in use of material saves the cost of construction.

5. CONCLUSION

From the literature survey the importance of cost control in construction project has been understood and the various cost control techniques are studied. There are various cost control technique which can be implemented in order control project cost. As per the study it has been found that if we use alternate materials without compromising the quality we can save the cost of the construction project. Considering alternative material for road construction the study shows that there is potential of saving 18.66 lacs which is will have substantial impact on the profitability of the project.

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