

# Project Planning by Zero Costing In Road Construction

Thirugnanasambantham N<sup>1</sup> Anbukkarasan E<sup>2</sup>

<sup>1,2</sup>PG Scholar

<sup>1,2</sup>Department of Civil Engineering

<sup>1,2</sup>Shree Venkateshwara Hi-Tech Engineering College, Gobi, India

**Abstract**— In this project Zero costing has been prepared and analyzed on a road construction project. In construction industry any project starts with making budget for it, the preliminary budget prepared is made as per the previous experience and consider cost incur roughly and in most of the time the cost in budget are very arbitrary taken as per previous experience. The Initial budget prepared is having high potential to vary in total cost by up to 20% if made by highly experienced professional. It directly means if things go wrong in budget, it directly impacts the profitability of the Project. Zero costing is something which is made from a scratch and not by doing many assumptions. to prepare a zero budget for construction project following need to be first available in place; BOQ prepared as per the final drawings and specification for Project. Rate Analysis for each and every activity from scratch i.e. - no assumption. Complete detailing of Overhead costs which will incur during project till completion. Staff Salaries- base on exact figures of payment. Material Rates. In Zero costing there are no cost are added directly without back calculations of it. All cost need to be justified in order to added into budget. In Zero costing when every expenses added together in summary sheet, we can make a profitability analysis for the construction project. It also helps in tracking project and ensuring cost of construction never exceed the budgeted amount.

**Keywords:** Zero Costing, Road Construction

## I. INTRODUCTION

The construction industry is an index of growth of a nation. The Construction sector in India has assumed growing importance with the liberalization of the economy. Currently, the construction industry is the second largest employing skilled, semiskilled and unskilled labor after agriculture and plays an important role in nation's economy. Due to increase in business opportunity and migration of labor, the demand for commercial and housing spaces has also increased, especially in urban areas. According to the tenth five-year plan, the estimate of shortage in urban housing is accessed to be 8.89 million units. As of now, the housing and construction industry employs 30 million people and about 250 industries are associated with construction industry directly or indirectly. It includes hospitals, schools, townships, offices, houses and other buildings as well as urban infrastructure, highways, metro rails, roads, ports, railways, airports, dams, power plants etc. Market globalization has in effect led to increased competition, not just between companies, but also on macro level, between individual countries. The need for improvement of organizational activities is thus felt not only in private industry but also increasingly in institutional, governmental or other non-profit organizations whose efficiency and effectiveness determines a countries competitive position in the world. Zero costing is mostly applied to most of the construction projects for having better recognition of scope of project and also necessary for

eliminating the cost which is unnecessary and also without affecting its functional requirement of each item concerned with the projects. Construction projects are nowadays getting bigger in size day by day and it is becoming necessary to complete the project in planned cost and time.

Until completing of the challenge. The fulfillment thing consists of shape making plans in preliminary stage, abilities of Contractors and Architect, Co –Ordination among the Client and contractor.

### A. Definition of Zero Costing

In construction industry any project starts with making budget for it, the preliminary budget prepared is made as per the previous experience and consider cost incur roughly and in most of the time the cost in budget are very arbitrary taken as per previous experience. The Initial budget prepared is having high potential to vary in total cost by up to 20% if made by highly experienced professional. It directly means if things goes wrong in budget, it directly impact the profitability of the Project. Zero costing is something which is made from a scratch and not by doing many assumptions. to prepare a zero budget for construction project following need to be first available in place; • BOQ prepared as per the final drawings and specification for Project. • Rate Analysis for each and every activity from scratch i.e. - no assumption. • Complete detailing of Overhead costs which will incur during project till completion. • Staff Salaries- base on exact figures of payment. • Material Rates. In Zero costing there are no cost are added directly without back calculations of it. All cost need to be justified in order to added into budget. In Zero costing when every expenses added together in summary sheet, we can make a profitability analysis for the construction project. Zero costing will also help in cutting down the costs by changing specifications for particular items and provide a budgeted products for buyers / clients. It also helps in tracking project and ensuring cost of construction never exceed the budgeted amount

### B. Benefits of Zero Costing for Construction Companies

The final cost is well justified and is as per companies specifications and standards. It helps in increasing strong communication in all department due to finalization of everything at the start. Improves performance and operating efficiency by challenging assumptions and examining expenditures By doing Zero costing and not relying on traditional budgeting percentage increases, we can significantly reduce the cost and make Project successful. The example Zero costing and Profitability analysis for a construction project is attached below, you can modify the data as per your project requirement and specified standards. Zero costing have complete analysis of rates for all construction items involve in that project, rates of materials, salaries of staff, overheads, Bill of Quantities of all construction items and finally the summary sheet of the same. In a nutshell, value is defined generally as a ratio of function

to cost. Value = Function/Cost (1.1) Where, Function is what the product or service is supposed to do. Cost is the expenditure needed to create it. Therefore, Value can be increased by either improving the function or reducing the cost. But while imparting the key factors in a construction project which is cost, time and quality. The existing expression maybe revised as, Value = (Function + Quality) / (Cost + Time) (1.2) Where, Function is what the product or service is supposed to do. Quality is the ability to satisfy stated or implied needs. Cost is the expenditure needed to create it. Time is the plan, schedule, or arrange when something should happen or be done

### C. Zero Costing

Zero Costing (ZC) usually projects several levels of possible expenditures and corresponding levels of maintenance. Louisiana at one time submitted five cost levels of highway maintenance as a percentage of current needs: 70, 85, 100, 110, and 110+ percent. The state now uses three levels: 85, 100, and 100+ percent. Other states submit varying levels. Although ZC is not used to a great extent, 14 states reported its use in conjunction with various types of budgets. Whereas some states go back to ground zero in justifying budget needs, some states use ZC only after fixed costs are considered. The budget is basically prepared in the usual manner. Then several levels of expenditure or work are established based on answers to the following questions: • How much must we do? • How much can we afford to do? • Now much should we do? • How much did we do last year? These questions are applied to each program, whether it is an activity designed to protect the integrity of the facility or to provide a traffic service. A cost-effectiveness analysis of each major work activity is required to justify the quantity standard each year. Some states reported that ZBB is effective if used from bottom to top of the budget process; however, most states noted that the system fails either at the top levels of management in the DOT or in the legislative process, and that the benefits of ZBB do not justify the large amount of paper work, time and effort required. Whether ZBB, as a tool for budget justification, is an aid or a hindrance depends on the extent to which administrators and legislators understand the system and are willing to take the responsibility for their decisions. Some states make full use of this procedure in the development of budgets, whereas in other states it is used only partially because administrators and legislators do not understand the method. Even though it is state policy, one state does not use ZBB at all; another does not use it to any great extent.

However, one state reported that in lean years, ZBB has been an aid in preventing further budget cuts. ZBB requires a large amount of detailed paper work and makes budget preparation more complicated and time-consuming. Even the states that submit a full ZBB to the legislature may find that cuts are made in line items (or by object of expenditure), which places the onus of functional cuts on the highway agency. The success of ZBB also depends on the budget expertise of the legislators to whom the budget is presented. 1.5 THE BUDGET PROCESS Budget planning starts with the determination of needs by the operating units of transportation agencies. These needs are then combined by the state Department of Transportation for presentation to the

governor or state budget director, and then usually presented to the legislature in a "budget message" from the governor. The legislature analyzes the budgets of all departments in relation to financial resources, such as income from motor-vehicle fuel and excise taxes, to ensure a balanced budget. After the budget is approved by the legislature, it is submitted to the governor for final approval and signature in the same manner as any other piece of legislation. The process for budget enactment is shown in Figure 1.1. The dashed lines depict the paths by which advice, guidance, and projections are furnished before budget preparation; they also depict the paths for any directives for changes after preliminary budget submissions are reviewed. The solid lines indicate the route of the budget from physical inception to enactment by the legislature and signature of the governor. The dotted lines show that the budget as approved by the governor (often called the appropriations act) in effect dictates policy to the state DOT by indicating the level of highway maintenance that can be performed with the funds appropriated. Although some steps needed for approval are eliminated in states where legislative and/or gubernatorial sanction is not required, the functional steps are the same

### D. Formulation of the Budget

Development of a state highway maintenance budget usually begins at the district or sub district level, or, in some states with maintenance management systems, at the maintenance division level. In the latter case, the initial draft of the budget is often referred to the districts for input and comments. In a few states, the district submits its needs for materials and minor repairs; then personnel and equipment costs are developed at the state maintenance division level. After the budget is initiated by the state maintenance engineer, it takes 1 to 2 yr before requested funds are available. Equipment cannot be ordered until funds for purchases are budgeted, even though equipment will not be delivered until a year or more after the order is placed. Thus future planning by state maintenance engineers is essential

If budget preparation is not based on a maintenance management system, one of the following methods is currently used: • The previous year's expenditure plus experience. • Inspection of roads, facilities, and equipment. • The previous year's expenditure plus changed conditions. • Expenditures of previous years plus inflation rates with adjustments for increased road inventory. Most states have highway maintenance budget review committees, which generally consist of a few district engineers, the maintenance engineer, and one or two individuals from the agency's budget or fiscal units. At the time the agency's entire budget is being formulated, personnel from higher management levels join the committee. State maintenance engineers generally indicated that they can and do formulate budgets based on the needs of their highway systems; however, they do not receive adequate funding to properly maintain the highways through enactment of the budget This can be translated into "products" that will not be forthcoming if highway maintenance does not receive the necessary funds. 1.7 ZERO COSTING VS REDUCTION Zero Costing is thus not simply a cost cutting method but improving value for service by modifying and enhancing functions. Zero Costing gets closer to cost control because it looks at ways to reduce cost on

specific items or activities. However, it does not look at the total project picture or check the daily performance it focuses only on specific items in the designs, procurement or construction area. Zero Costing for cost reduction Zero Costing can be applied during any stage of a project cycle. ZC may be applied more than once during life cycle of construction project. Early application of ZC helps in more organized implementation of project activities, thus reducing overall cost by avoiding any major changes right in the beginning. If the application of ZC is done in later stages it may result in higher project cost. ZC is applied in an organized process known as ZC job plan. The purpose of job plan is to assist a study team to identify and focus on key project functions in a systematic manner, in order to create new ideas that will result in value enhancements. 1.8 BENEFITS ZERO COSTING There is always a scope to improve value, in terms of material value or the worth. The main objective is to provide all necessary functions at a lowest cost. The aim of this thesis to conduct a study on Zero Costing also to understand and identify the areas of poor value in structure and to understand the cost saving attained after conducting ZC study with that of conventional one.

## II. THEORY OF ZERO COSTING CONCEPT OF ZERO COSTING

The Zero Costing is a scientific method through which we strive to improve the value of the product/service from the point of view of the customer to have the desired function from the elements of the product cost at the reasonable cost of the deployed resources. ZC always takes into consideration of the existing product and services. The objective of maximizing profit by proper examination of all the areas which is having high cost and finding ways to eliminate those unnecessary cost and do benefit for the company. The main focal point in ZC is reduction of material cost. The value is increased by reducing cost and retaining the value of the product/service. Also sometimes the increase in cost is necessary but also it should be considered to increase the value much more than cost. The Zero Costing team comprises of a cross functional team and it is necessary for all the key expertise to be in the team for the best outcome of the ZC study. The method of selecting critical areas will result in the success of ZC. It is necessary to select the critical high cost area so that we can have better outcomes. Also before selecting the areas it is necessary to categorize into prominent categories so that it will give us better idea to select from the most appropriate categories. The ZC team has to initially study all aspects of the project including the performance function of each aspect. Then with help of proper tool select the most appropriate areas. Zero Costing has always proved to be one of the best solutions for all the major cost runs in a project which can be controlled. 3.2 II) FACTORS INFLUENCING ZERO COSTING There are various factors which has a great influence on the Zero Costing study.

### A. Customer Requirements

The basic function of any product is to provide satisfactory performance to the customer as they are the prime importance of any business. While doing Zero Costing it is necessary to keep the basic function of the product/service same and also the functionality of the product should not change. There is

always a must and want type of needs. It is necessary to keep the must needs of the product and the want needs can be taken into consideration depending on the cost and utility.

### B. Brand Value

When a service is in a market it is always having a brand name associated with the product/service. This is also considered to be one of the important aspects as Zero Costing shouldn't hamper the quality of the product thus affecting the brand value. It is always used to study in detail the benefit and problems associated with the alternative material. Selecting the most appropriate material along with keeping up the quality of the product/service is important.

### C. Cost of Material and Labour

The cost of material is the major 50% cost of total cost of the product. Hence it is very important to consider reducing the cost of material by way of reducing wastages, substitution with alternatives without affecting quality and even adding some changes to the existing material. Even a very small reduction can bring about much reduction in the overall cost. The labour productivity is a major issue and we need to seek for ways by means for improving the productivity and improving overall efficiency.

### D. Systematic Process Approach

The major problem for effective functioning of Zero Costing ideas needs a systematic process approach in the organization. If the methods in which the activities are done are not controlled and not systematic then the Zero Costing is of no use. It requires all to involve together and understand the objectives of the company and cooperate together so that success is achieved. It needs to be taken care that all the processes need to be crucially studied and identify the problems so that better function ability is achieved. CONTINUOUS IMPROVEMENT The systematic methodology should be followed so that the Zero Costing changes made to the organization has an impending effect for future. Also continuous monitoring on periodic basis is required so that it can be analysed where there are problems mitigation of the same can be done at earliest. The continuous improvement will ensure the stability of the organization and also much cost savings in the unnecessary cost.

### E. Problems Faced In Construction of Roads

The Road construction is one of the prominent sectors where India is having much greater growth in the recent years. There has been much cost incurred when it comes to construction of Roads. There is also much unnecessary cost which comes throughout the life cycle of construction. More precise ways have to be taken to have such roads to be constructed. During the planning stage itself many aspects which affect the cost of construction have to be considered. The necessity of a value based design is an ultimate necessity of road construction. The Roads are always designed heavily as heavy loads are expected to be imposed on the structure. The major problems faced in construction projects are

- 1) The improper planning is considered to be one of the major problems to affect the cash budget. When there is an unexpected uncertainty which comes up and due to which the finance of the project is certainly affected and

also there can be other problems which comes up due to improper planning.

- 2) Lack of skilled workers in the execution of the projects. As major construction is having a need for skilled workers as there is precision required in the activities. Lack of proper workers available affects the schedule cost and quality of construction projects.
- 3) An environmental regulation hinders the conformance of the project as per the requirement. It is necessary to design considering the requirement and environmental restrictions. The cost of considering these environmental aspects will increase in the cost of construction and indirectly affecting the budget.
- 4) Increase in cost due to safety issues is also one of the major concerns. Due to some thefts or some problems due to internal staff also affect the functioning of the activities in the project.
- 5) Cost overruns are a common problem in the construction industry. It is necessary to identify those areas where these cost overruns occur. It can be due to various reasons such as improper handling of materials, no proper methodology and functioning efficiency.
- 6) There is huge scope of work which is involved in the construction projects and many times there is a dispute that arises in the course of work so to resolve the disputes there needs a DRB or arbitration and that is a time consuming process and can be a major reason for delay in completion of projects.
- 7) Due to constraints in the schedule of works it becomes necessary for completing the works in restricted time which impacts on the quality of works and ultimately puts black mark on the organization

### III. APPLICATION OF ZERO COSTING IN CONSTRUCTION OF ROAD PROJECTS

#### A. General

There has been much competition in the construction sector from last decade and it requires them to have a better reliability towards the customer which intends them to give better services at reasonable cost. There are many factors which need to be considered for keeping a low cost. It is necessary to know that having low cost is not only the binding factor but also it is necessary for them to have a better value to their project. The value in this case can be different for all concerned parties. Each party tries to have a better value and the main motive behind a business is to have a good profit. When it comes to the contractor side he would always try to complete his work in the lowest possible cost similarly for the client he should be getting maximum gains as possible. The customer has to only consider his comfort level and the design team would consider its functions and aspects to be taken into consideration. As construction involves a larger amount of task starting from the planning to the execution stage, there is a risk of completing the tasks in the given time and cost. Also it should be considered that the durability, reliability of the work should also increase. It is necessary to take precautionary measure in the planning or initial stage but we take fewer measures for considering value. Also after the work completed it is less seen the tendency of comparing the construction with the value but generally it is seen that the

profit basis is been considered and compared. In Zero Costing we consider for designs which are integrating both value and cost and for that it finds the critical elements and eliminate the unnecessary cost associated with the project. The production cost is always a major concern and it has to be reduced for achieving a better reduction in the overall cost of project. It can be either the material cost, equipment cost etc. It's always necessary to check whether the equipment and materials being used are according to the conformance of the current needs and if not then it is necessary to replace them with materials which is equivalent to existing material and also it's necessary to consider the cost reduction aspect also.

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