



USING ADVANCE METHODS AND REPLACING REDUCING IN COST OF CONSTRUCTION

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Abstract--- The construction project can vary from extremely profitable to barely worth it and sometimes end up costing the contractor more than what he or she is getting paid to complete it. In construction industry the aim of project control is to ensure the projects finish on time, within budget and achieving other project activities. One of the most important parameters that is currently used in public and private procurement in building process is the lowest price. The legislation of Latvia permits that an estimate forming process does not include criterions of

Quality , durability, and the potential high cost of maintaining the building during exploitation time.

That allows the constructor to reduce the cost estimate by using cheaper construction product or technology and does not let to provide the highest possible quality and the basic principle of sustainable construction. and cost are two main concerns which increase importance of cost reduction techniques. Reduction of cost of construction is a constant goal for construction industry. One way of reducing construction cost is to develop innovative technologies as well as methodologies to increase productivity. This paper covers types of cost, factors affecting cost of projects as well as discussion on achievement of satisfactory results of time and cost by applying cost reduction techniques. The selection of low-carbon and sustainable building materials is crucial in reducing the built environment's carbon footprint.

1. INTRODUCTION

In many construction projects project managers and contractors find difficulties like poor planning of project, poor material, labour shortages, increased cost of material, delays in deliveries, wastage of material, over budgeting, unexpected weather changes, lapse in management and control, loss of material, poor communication etc. The calculation of construction costs is essential for any construction works, as well as for the control of project process. It contains the exact organizational information – materials, number of machines, required workforce that is necessary to complete the project (Del Pico, 2012). Each customer is interested in achieving the desired goal, but most importantly it is to do the work, consuming the least possible financial resources. Low costs of building object is one of the factors that influences the quality of construction. The lowest price principle cannot be assessed objective and it does not guarantee the quality of the building. During the evaluation of offers it would be more objective to take into account the price-quality ratio (Ozoliņ, 2014). This results into cost and time overruns, conflicts in project. So there is need to study costs included in projects and to identify cost reduction or cost control techniques for carrying construction. Reduction of cost of construction is a constant goal for construction industry. One way of reducing construction cost is to develop innovative technologies as well as methodologies to increase productivity. Due to cost reduction techniques cost of project is managed so that contractor does not suffer losses while carrying different activities of projects.

2. COST

2.1 What is Cost? Expense incurred by a contractor for labour, material, equipment, financing, service utilities etc. plus overheads and contractors' profit. Cost of land, architectural design, fee of consultant and engineer are not construction costs.

2.2 Types of cost :

Fixed Costs

Fixed costs are those that do not change throughout the life-cycle of a project. For example, if construction of road is there, the excavators and bulldozers are fixed costs. For software development projects, the physical development space and development computers are fixed costs to the project.

Direct Costs

Direct costs are expenses that come out of the project budget directly. For example, if outsourcing some of the development work, the developers are expected to put in a specific amount of time, which is then billed for. The developer salaries are direct costs.

Sunk Costs

Sunk costs are those that have been incurred in a project, but have not produced value towards the project's objectives.

Assumptions for material replacement

The four scenarios considered in this study for the residential building and non-residential building sector in are as follows:

- Business-as-usual (BAU) scenario: uses reinforced concrete design from 2009 to 2050, with electricity generated from fossil fuels.
- Business-as-usual with Renewable Energy (BAU-RE) scenario: uses reinforced concrete design .

1) from 2009 to 2050 and assumes 96% renewable energy supply combined with an increase in electricity demand of 143% by 2050 based on a scenario from Climate Works .

- Timber scenario: Reinforced concrete design (refer to Table 1) decreases at the rate of 2.4% from 100% in year 2009 to 0% in year 2050, whilst CLT design increases from 0% in 2009 to 100% in 2050 at the same rate. Growing renewable electricity supply and demand as per the BAU-RE scenario. Two variations of this timber scenario were explored – with and without sequestration. Sequestration was estimated 100% in 2030 and gradually

decreases back to 0% in 2050. Over the same period.

3. PRICE FORMATION

It is not possible for two estimators to draw up two identical estimates of the same object. This is due to the experience and knowledge, as well as the differences of modeling the work description, choice of technique, coefficient of building material consumption and the related evaluation of auxiliary work.

Advantageous conditions for exact estimate, which actually is not possible

Now a days, should comprise :

- 1) stable material prices;
- 2) insufficient amount of labour;
- 3) invariable prices of resources;
- 4) adequate amount of time;
- 5) moderate competition

Within the process of the project realization construction costs are determined twice before launching the construction work. Originally the budgetary estimate for a developed project is drawn up, when the estimator is working the customer.

4. FACTORS AFFECTING CONSTRUCTION COST

There are many factors which affect the construction cost estimate and have significant impact on project cost and they are as following:

- 1) Similar Construction Projects: For the construction estimate, the best reference will be similar construction projects. The final cost of those similar projects can give the idea for the new construction project cost calculation. The final cost of past project needs to be factored with current construction cost indices.
- 2) Construction Material Costs: Construction material cost consists of material cost, shipping charges and taxes applicable if any. So, it is important consider all these variations while calculating construction material cost.
- 3) Labor Wage Rates: Labor wages varies place to place. So, local wage rate should be considered in calculation. If the project has to be started after several months of estimating the project cost, the probable variation in wage rates has to be considered in the calculation.

4) Construction Site Conditions: Project site conditions can increase construction costs. Site conditions such as poor soil conditions, wetlands, contaminated materials, conflicting utilities (buried pipe, cables, overhead lines, etc.), environmentally sensitivity area, ground water, river or stream crossings, heavy traffic, buried storage tanks, archaeological sites, endangered species habitat and similar existing conditions etc. can increase the project cost during construction phase if these variations are not considered during estimation.

5) Inflation Factor: A construction project can continue for years before completion. During the construction period, the cost of materials, tools, labors, equipments etc. may vary from time to time. This variation in the prices should be considered during cost estimation process.

6) Project Schedule: Duration of construction project is affects the cost. Increase in project duration can increase the construction project cost due to increase in indirect costs, while reduction in construction cost also increases the project cost due to increase in direct costs. Therefore, construction project schedules also need to be considered during project cost estimation.

5. COST REDUCTION TECHNIQUES

4.1. So, there are various cost effective techniques of construction. Lots of them are also energy efficient and easily adoptable. Since India is a developing country, the economy has importance. There is a need for the adoption of strong, durable, environment friendly, ecologically appropriate, energy efficient and yet cost effective materials and appropriate technologies in construction.

4.2. In construction project reduction in cost can be achieved by some of the following techniques:

- a) Value Engineering
- b) Material Management
- c) Budgetary Control
- d) Cost optimization Techniques

a) Value Engineering: Value engineering is a systematic application of recognized techniques which identify the functions of the product or service, establish the worth of those functions, and provide the necessary functions to meet the required performance at the lowest overall cost. Application of Value Engineering (VE) to construction projects is a solution which emphasizes the function of project which helps to

team to make final choice and which results in cost effective design for project.

b) Material Management: To manage productivity and cost efficiency material management is essential. It contributes the major portion of expenses in construction projects. Controlling procurement, carrying cost can reduce total project cost and complete the project in a fast track method. ABC (Always Better Control) is the tool to identify those material. By resource leveling, smoothing usage can be brought to optimum refined level so that much storage cost can be eliminated. Economic Order Quantity (EOQ) is arrived, then sensitivity of material is checked using what-if analysis. Then effect of project is checked to find optimum solution. This optimizes total project cost.

c) Budgetary Control: For cost control on a project, the construction plan and the associated cash flow estimates can provide the baseline reference for subsequent project monitoring and control. For schedules, progress on individual activities and the achievement of milestone completions can be compared with the project schedule to monitor the progress of activities. Contract and job specifications provide the criteria by which to assess and assure the required quality of construction. The final or detailed cost estimate provides a baseline for the assessment of financial performance during the project. To the extent that costs are within the detailed cost estimate, then the project is thought to be under financial control. Overruns in particular cost categories signal the possibility of problems and give an indication of exactly what problems are being encountered. Expense oriented construction planning and control focuses upon the categories included in the final cost estimation. For control and monitoring purposes, the original detailed cost estimate is typically converted to a project budget, and the project budget is used subsequently as a guide for management.

d) Cost Optimization Techniques:

In design, construction, and maintenance of any engineering system engineers have to take many technological and managerial decisions at several stages. So ultimate goal is to minimize the effort or to maximize desired benefit. Various mathematical programming techniques are used for optimization of construction cost of project. Some of them are non linear

programming, dynamic programming, integer programming, stochastic programming etc.

6. METHODOLOGY OF RESEARCH

The research is based on the real estimate of a family residential house which includes construction materials. During the research process certain building materials were selected, analysis of their technical data was done, analogue materials were found, their laboratorial and theoretical comparison was made, data were compiled and the costs of one unit of building material were compared. The alternatives for the selected building materials were searched – analogous building materials with the defined technical characteristics. During the research analysis of technical properties, costs and comparison of analogue and similar construction materials were carried out. While carrying out the data collection of the research work, comparative method and analytical method was used.

As the residential house estimate is for an individual customer, rather than for public procurement, it is not expected that during the analysis the estimate could reveal dumping or abnormally low price existence.

The choice of the cheapest offer in itself excludes the possibility of the work to be performed qualitatively. Dumping not only brings losses to the economy in the form of unpaid taxes, but also degrades building industry as a whole. (Baltic News Network, 2010) Comparable construction products were selected from the real estimate of the family residential home.

7. CONCLUSION

It was discussed that using cost reduction techniques by multidisciplinary team, value and economy are improved through study of alternative design concepts, material and construction methods without compromising functional requirement and quality. Cost effective construction techniques, material and different management strategies during the execution of project plays important role in saving time as well as cost of construction. Thus, cost reduction techniques assures best cost, value will be obtained over life cycle of the building or structure.

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