

CHARACTERISTICS OF COST MANAGEMENT IN CONSTRUCTION PROJECTS

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Abstract: In the current work of organizations expect construction projects to be completed in a certain time and resources that were originally allocated. Construction project cost expressed manpower effort and actually materialized is submitted for the project. Project cost management is a process that involves estimating, planning, and controlling costs so that the project does not exceed the budget. Project cost management must take into account the need for information to stakeholders. They can measure project costs in time and with different methods, their vision of the project cost could be different. Although primarily aimed at project cost management costs associated with the necessary resources for successful completion of the activities that make up the project, from the design phase - feasibility should be considered life-cycle cost of a construction project. It provides, especially in terms of customers or users, real total cost of the project construction.

Keywords: cost, management, construction, projects, characteristics.

1.The need for cost management of construction projects

Construction projects should be developed and delivered under certain constraints: objectives, time and cost. The three constraints are often competing in a project: a more ambitious usually means more time and a higher cost assigned to the project, a more severe restriction in terms of time may result in increased costs or a decrease in the final product requirements and a fixed budget means more time wasted for the project or, again, low requirements. Therefore, the management cost of the project must take into account other aspects of the project, systemic thinking in this case is essential.

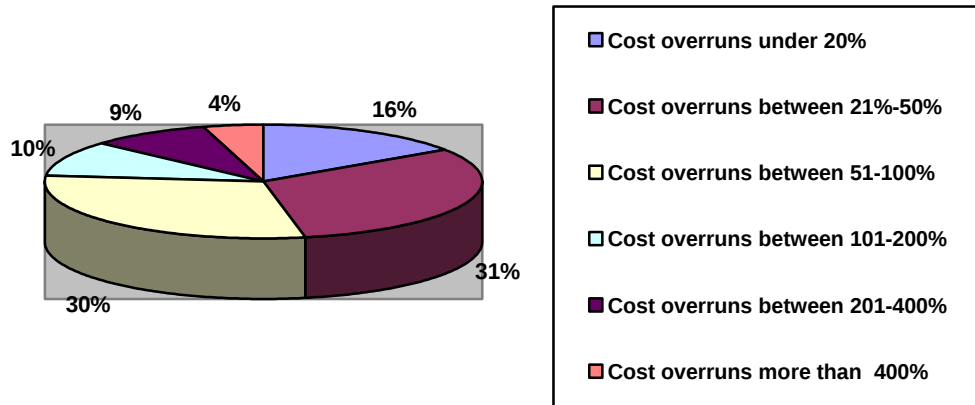
Project cost expresses effort and manpower it materialized that a company actually filed for the project of construction of an object or a building construction.

Cost overruns or lead times are the most important reason for fear of a project manager because they affect the organization as a whole and its status both within the organization and the sector.

Reputation compromised in a project completed overruns lead times or costs reduce the chances of occupying the post of manager of the future projects. For the project team cost overruns or lead times lead to lack of motivation to be involved in future projects or overly cautious in their approach.

Not any cost overruns or failure lead times are only those that are of significant deviations compared to original estimates. Studies in this direction and published Standish Group CHAOS reports are significant in this regard.

Chart No. 1. - The share of project cost overruns reportedly CHAOS



According to reports CHAOS frequently exceeded project costs are between 21% and 100% (60% of project cost overruns). Also 4% of projects had cost overruns had a final cost of more than four times higher than originally estimated.

Standish Group analysis was performed on 30,000 projects in all fields. Projects in certain sectors have their own specific about deadlines or cost overruns. Thus, data from BCIS (Building Cost Information Service) on annual average overruns or cost limits for 1267 construction projects in the UK have revealed deviations of costs between 50 and 80% means a lot for a building project.

2. Characteristics of cost management in construction projects

A cost effective management involves the implementation of repeatable steps and methodologies from one project to another (even taking into account the uniqueness of each project) that can be integrated organizational goals.

As a process, project cost management includes the following sub-processes:

- Resource planning - here determines what resources (raw materials, labor) and what quantities are necessary to carry out the proposed activity.
- Cost estimating - the development of an estimate, even if approximate, the costs of using resources previously planned
- Create a budget - this is allocated the total estimated cost of the various activities that make up the project resources
- Cost control - once allocated costs and started the project, it is necessary to take into account the actual costs incurred, to be able to make a comparison of their projected to be able to take corrective action if necessary.

There are basically two types of approaches to estimating costs related to:

- Estimating upward - involves estimating costs for each level of the WBS's, processing and gathering them by level managers of the project, ranging from the lowest to the top of the project hierarchy.

- Estimating top-down - the project manager receives a certain amount of money, which must carry the entire project. This amount is divided into sub-projects within the overall project, and the activities are based on estimates of the project manager, either the target costing technique.

Target costing means setting a target price for the final product of the project, giving the price competitiveness of the product in the target market, as well as a profit margin set by top management decision. Following these two actions, determine the total cost of acceptable size. Designers range from the total value and calculate the costs accepted for each product component. The major impact of this technique is felt by component suppliers, who are forced so they reach a cost for their products, which enables them to profit.

One of the advantages of top-down estimate is creating a competition among makers of activities. It is conceivable that this is an advantage as long as there is fairness in resource allocation. If some managers have various levers to attract more resources from their work than they need, this competition turns into a disadvantage.

Regarding bottom-up approach, its main advantage is the estimate on each level of the people who will perform work or by their supervisor. They are best able to determine the costs of the activities to be undertaken. Also, if top management supports the suggested values of workers, they will be more motivated to meet these costs than if they would have imposed leadership.

Although in principle there are only two major types of estimation methods, techniques which groups in each of these types are many.

Shows a variant by analogy estimates the estimate up and down. This method uses the actual cost of previously completed projects to forecast project cost estimate is pending. Thus, there is an analogy between a project and another. If the design has been used in analogy to the estimate which is very similar estimates could be quite accurate. If projects are very similar, the estimates will be no precise.

Parameter estimates are similar to analog by the fact that they are up-to-walk estimates. Their inherent accuracy is neither better nor worse than the estimates by analogie. Putem use this costing you have enough data about a particular kind of project. Parameter estimation involves undoing project easily quantifiable units (eg m² of space that will be built), which are associated a cost determined by experience.

Final estimates are a variation of the bottom-up. This is the kind of quote that is used to establish the basic plan of the project or any other important estimates. The accuracy of this estimate can be quite high, but the cost of achieving them can also be quite high, and during the execution long enough.

Final estimates are based on the statistical central limit theorem. If you have a group of details that can be added, change the amount of detail will be less significant than variations significance details. All this means that having more information about an estimate, the amount of detail will be more accurate because some of the detailed estimates will be overestimated and others underestimated. Overestimates and underestimates will cancel each other. If we have sufficient detail, the average overestimation and underestimation will approach the value "zero".

Typical problems that arise in estimating costs are:

- inappropriate use of the estimate - people are required to make estimates on the costs of challenging activities such as building a unique car just to record this estimate a target cost plan;
- estimates using data from irrelevant - people often take into account past experience is not representative or not check if it was really a good representation of reality (it is not uncommon that such situations persist many years are missing checks);
- estimates out of context - having given an estimate of the cost of conducting business, then it is used regardless of the important changes that may occur to the place or manner of work.

Estimates are and will remain only estimates of costs that may arise in the project. Expresses the value of the bid price required for execution of the work specified in the project depends directly on three factors: the size of direct costs; amount of indirect costs; size of the expected profit.

Costing executives and estimate unit prices on items. For construction projects scope of work is determined by the schedule, and the price per item estimate is determined based on the specific consumption of resources and prices and tariffs used by resource providers.

Calculation of indirect costs for the project are determined, as I mentioned at the beginning of the chapter, by applying percentages of direct costs of the project practice used in our country, or direct labor.

Note also that these costs should be included and any unproductive costs, such as losses from disruptions caused by internal or external factors deficiencies found in the inventory of current assets over established norms.

According to some specialists "not in all the analyzed methodologies calculation has as purpose the general quotation or the quotation on object, the structure of expenses resembles, including the same categories" (C.Simion, M.Rus and C.Enulescu, 2008).

The size of the expected profit is determined also as a percentage applied to the total cost. Amount of income included in the offer price is also subject to external factors such as competition, market conditions, etc.

3. Cost optimization of construction projects by Earned Value Management

Controlling the cost of project management is best achieved by using earned value reporting system. This system makes it possible to measure cost and schedule performance in the same system performance budget. This is possible because the two types of performance have one and the same unit of measure, namely money. Project performance above or below the program is also measured in money. When choosing another method of cost control, there will be separate reports for performance measurement and budget cost estimates.

Earned Value reports are cumulative reports. Values collected for the current reporting period are added to the values obtained from the last reporting period and the total is represented on a graph.

Value added reporting system depends on three variables identifying the project:

- Budgeted cost of work scheduled volume - each of the activities in the project has its own cost and estimated own schedule. It represents the cumulative budget - will be shown on a timeline that shows when the expenditure is in accordance with the project plan.
- The real cost of workload executed - as the project progresses, the actual cost accumulates. The real cost is plotted cumulatively over the same timeline. The real cost is translated for each time period to which it relates.
- Budgeted cost of workload executed - this value is called value added. We will report the cumulative value chart workload effectively completed. Value achieved workload is assigned the budget was estimated for that workload. The same time axis represent the cumulative cost of the workload performed (actual cost). The added value is plotted for each time period with the actual work performed based.

Budget in the final phase - is the point that represents the total project budget. Variation in the cost - it is the difference between the actual work completed and cost associated with the workload. A positive variation means that the situation is good, and a negative change indicates that the situation is not good.

Changes in the program - it is the difference between the amount of work actually completed and that which was expected to be completed at the time of time. A positive change means a good situation and conversely negative variation. Importance in EVM have cost and schedule performance indices.

Variations in cost and program changes in the phase in which the project is located. At the beginning of the project, small variations can be important, but later in the project, the same type of variation may not be so significant. For this reason, using clues. Index values are the same for variations with similar meaning.

Estimate at completion (EAC) - is an estimate of the project cost at completion of the project. This is BAC adjusted current performance to date. It is said that if the project continues along its current level of performance on cost, EAC will become final cost of the project. This is a pessimistic value, since it is said that the mistakes made in the project is expected to be repeated until the end of.

Estimate to completion (ETC) - represents the remaining budget needed to complete the project if work continues at the same pace as in the moment of performance.

4.Determining Life Cycle Cost (LCC)

In the literature there are several approaches to the concept of life-cycle cost. In 1977, the Department of Industry of Great Britain, published The Life Cycle Cost management properties, which presented one of the earliest definitions of life cycle cost: "A concept that brings together a number of techniques - engineering, accounting, mathematics and statistics - to take into account all net costs over the life of the asset. Life-cycle costs on quantification options to determine the best way to configure active future. It is permissible to establish total life-cycle cost and a balance between cost items during the life stages of activities to be studied and the optimal selection, use and replacement. "

In the U.S., the method has been called life-cycle cost (LCC), was introduced by law in most federal states since 1981 (standards have been developed LCC recommendation, application manuals, computer programs).

In France, the method was studied in the Economic Department of the Scientific and Technical Centre for Building CSTB. Maintenance costs have been determined on the buildings (facades, roofs, cladding and installation) for a large sample of housing.

In England, although there were concerns regarding the determination of costs during operation LCC method was introduced later, conditionality is contracting works, specifying the subsequent annual costs and personnel to their exploitation.

In Sweden, the overall cost is called total cost and requested the forum that advises investment for construction and urban planning projects they manage, as updated. In Germany, the advisory activity manuals have been developed to estimate the total cost annual values for proper housing, administrative buildings and schools and maintenance costs. In Romania, was developed "Guide on the application of the overall cost in construction", approved by Order of MLPAT 2/N/1992.

The global cost is defined as the sum of the initial efforts to achieve economic of an investment and subsequently for maintenance and operation. In terms of overall cost static formula can be expressed as synthetic

Global cost = Initial cost + Subsequent costs

These costs include maintenance, current repairs, repairs, replacements and operating costs. This method underlies economic decision to invest and allocate resources reasonably in relation to the destination and use. The method developed particularly after the global energy crisis of the 70s. Application of the method was due to the following factors:

- it was found that the time budget decisions early stages, led to further cost very high (between 50% and 80% of the total charge).
- increased maintenance and repair costs and increased design and construction costs to meet the challenges of new control and safety caused by aging built heritage through wear and tear.
- increased operating costs due to increased fuel prices and energy, which has generated a variety of new design solutions and implementing new technologies;
- the buildings were private investment objective impact on living and working conditions of the population.

Problem analysis of "life cycle cost" can arise only when you can define two or more versions of the same product, of which choose the minimum life cycle cost. Landmarks that define the application of the concept of life-cycle cost of construction - LCC are initial costs related to the investment, the subsequent costs related to operation and maintenance, the period of analysis, time reference and discount factors.

Regarding the determination of the life-cycle cost of construction is necessary to consider certain general elements of calculation:

- life-cycle cost of construction is the sum of initial costs (expenses research, design and execution) and subsequent expenditures (expenditures for the

operation and maintenance of the expenses of post-use may be demolition, dismantling, re, recycling);

- for adding the two groups of expenses that occur at different times, it is necessary to update valorilor. Aceasta involves choosing the most appropriate discount rate, inflation targeting, addressing risk in decision making etc;
- to be aggregated costs incurred at different times of the life cycle must be expressed in the same units (eg euro / sqm year euro / sqm, etc);
- surfaces to which the costs shall be established as necessary for building elements, parts of objects or object construction;
- the time horizon is considered in most cases equivalent to the normal service life of the object or element analizat. Când this time horizon is removed the risk that a solution adopted today may no longer be valid increases; In such cases the analysis may be conducted on time horizons smaller than the normal, called the study period;
- to give value adding costs to the overall cost of the construction life cycle and consumed at different times it is necessary to apply discount factors. By applying these factors, the costs are brought to the level of a given benchmark, usually the year in which it is compared.

The biggest benefit of an analysis of the life cycle cost occurs when it is performed before starting the actual execution, because during the design specifications may be changed without additional costs very high. When construction was done or when changes occur during the execution cost impact is much greater.

It is therefore very important that the initial structure of life-cycle costs include all cost categories as elements with a major impact on total life cycle cost.

Regarding the initial costs must be taken into account the costs of design and execution.

In the design, basic services occupy themselves throughout the design and execution tracking works by establishing design basis until final acceptance of the work. The content of the various phases - steps may differ depending on the complexity of the investment and the pace of the installation, the type of financing, etc..

Basic services performed by the designers include:

1. Develop preliminary draft pre-feasibility study and feasibility study.
2. Developing technical design.
3. Develop a building's energy performance certificate.
4. Documentation for obtaining building permits and licenses.
5. Provide details and follow so strictly observe project execution, regulatory requirements in force, investor requirements and coordination of details with contractors and suppliers.
6. Reception and complete their work (tabulation and compile the technical construction).

Design costs have the following structure:

Phase 1: Deposit upon signing the contract 10% ;

Phase 2: Phase preliminary draft: 15 to 20% ;

Phase 3: Project Phase: 25-40% ;

Phase 4: Execution phase: 20-25%;

Phase 5: Final stage (reception): 5%.

According to the provisions set out in the "Guide of the architect" calculating fees based on a percentage of the work is recommended for the evaluation of basic services. Fees shall be calculated on installment calculation of the value of investment (excluding VAT) and 5 classes pricing.

Construction costs include expenses related to all objects contained in collective investment: buildings, special buildings, installations related to building, electrical, plumbing, interior installations of natural gas, heating, ventilation, air conditioning, fire protection, telecommunications and other facilities imposed target destination.

In order to address operating costs as a component of cost per life cycle cost are three structures dedicated operating internationally:

- the common approach British institutes BCIS (Building Cost Information Service) and BSI (British Standards Institute);
- approach proposed by ISO 15686;
- approach of Management Consulting firm Davis Langdon.

In addressing BSI BCIS and cost of operation of a building has three major components:

- maintenance costs;
- operating costs;
- users costs.

Is presented in ISO / DIS 15686: 2006 Part Five entitled "Standard Cost Groups - Life Cycle Costing (LCC)". Operating cost structure includes the following categories of costs:

- maintenance costs;
- operating costs;
- occupancy costs.

The approach proposed by Davis Langdom Management Consulting firm has a simplified structure of operating costs consist of:

- operating costs;
- maintenance costs;
- replacement costs.

Replacement costs include:

- restoration or replacement of essential parts of the building to ensure their aesthetic and functional performance of the original;
- unavailability of construction on the time of the restoration, rehabilitation and replacement;
- unexpected costs due to changes in legislation on environmental issues, safety, public health or taxation;
- adapt the construction of parts of its restructuring.

The costs of maintenance, repair and rehabilitation are common exploitării all construction and maintenance depend on the strategy chosen, the existing methods of determining costs on future exploitation and development opportunities of these methods in the future.

Energy consumption costs are easier to estimate the phase analysis of design alternatives, especially if the designer and owner / user are oriented towards eco-design. The difficulty for this category of costs is the result of long periods of operation of the building that does not allow a high accuracy rate forecast and real escalation in energy.

Environmental costs depend on the inventory of resources / emissions / waste existing at the time the estimates are made, all calculation models presented depinzând such inventory cycle viață. Costurile demolition and decommissioning depend on the structure and as a way of determining method of demolition / dismantling chosen.

5. Conclusions

For construction projects should not exceed the allocated budget should be a formal process to pursue cost management planning, estimating, budgeting and cost control over their whole life cycle. If the duration of the project by techniques such as EVM is known and compare the actual development of the project cost in relation to the estimated cost initially ensuring the possibility of estimating the cost to complete the project life-cycle cost perspective is important for customers and users.

By analyzing the life cycle and life cycle cost determination shall ensure management lifecycle cost of a building project, which meets all stakeholder interests involved in its customers, designers, performers, suppliers of materials and equipment, consultants, public authorities.

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