Analysis of Risky Factors Causing Cost overrun in Construction Projects

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Abstract— Construction industries play an important role in economic growth and development of any country. In the Construction industry cost overrun is the major problems occur because of some risky factors. Because of these factors the construction work cannot completed at stipulated time, within budget. To minimize the effect of that risk on cost overruns, we have to be aware of the fact that which risk affect the cost overruns in how much quantum so for that we have to give particular ranking pattern so we can easily reduce the effect of that risk and we can complete the project with our satisfactorily requirement. In this paper we shown that understanding of the project management constrain for the cost overruns and the studied one case study of identified most Risky factors causes of cost overrun in construction projects and their remedies.

Key words: Cost Overrun, Risk Factors, Risk Management

I. INTRODUCTION

In many cases, project managers know that other projects have overrun their budgets, but they may feel that (1) this project will be secure from overruns because they are good project managers, (2) if the project overruns its budget the causes of those overruns will be evident to all and will not be judged to be their fault, or (3) since all projects overrun there will be no personal consequence to them. There is a fair amount of self-deception in the project management world about both cost estimates and schedules. The main reasons for cost overrun the estimates, assuming that the cost estimators are competent, relate to the corporate culture and to the risk in the project.

Corporate management, including those responsible for selling the project to the customer, contributes to cost overruns by influencing project cost estimates to be underestimated. This is the corporate culture that tends to prefer estimates and schedules that are optimistic, perhaps calling them challenges or stretch goals.

Risk in the project, including estimating uncertainty, is often more likely to push the costs higher than lower. This cost growth or upward pressure is often the result of making estimates based on optimistic rather than realistic assumptions.

Each of these Risky factors can lead to estimates and schedules that are not, and have never been, achievable. Both the influence of corporate culture and the presence of serious project risks are often ignored, underestimated, denied or otherwise not analyzed and corrected. [2]

II. PROJECT MANAGEMENT CONSTRAINT

The main objective of project is most common illustrated in the project triangle which can be seen in figure 1.

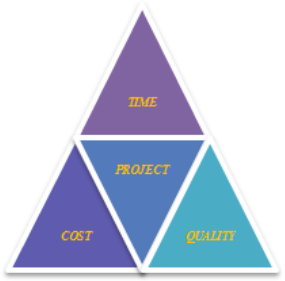

Fig. 1: The project triangle [1]

Source*: Alex Maj Bangsgaard (2010) Method for Risk Analysis in regard of different types of projects*

As seen on figure 1 the objectives for a project to stay within is:

- Time: - the project must be completed on time.
- Budget: - the project must be accomplished within the budgeted costs.
- Quality: - the project must the completed within the specified quality requirements.

Every project will have these criteria though projects can have a priority in one of the objectives. If it is time-bound the project must be completed on time even if it means that it will have higher costs or the quality will be poorer, e.g. if the project must be done for a certain event. And the same goes for cost- and quality-bound projects also. So the three objectives are connected to each other, which is why none of them can be ignored.

Some project managers do also include a fourth dimension, which is the criteria of safety, while others argue that it is already in the three dimensional model, and that safety is so basic that budget, time and quality should be reached within safety.

III. PROJECT LIFE CYCLE

The best way to present how a typical building project is structured is by help of the project life cycle. A typical project life cycle is divided into phases, each with a predetermined purpose and therefore an identifiable scope of work. The project begins with an idea, and then it is developed in many steps and at the end closed and terminated. Every project has its design phase, construction phase and closing- termination phase, which are partly overlapped from phase to phase. The phases can be defined in different ways. Below an example of how a typical building project can be divided into several phases is presented in Figure 2

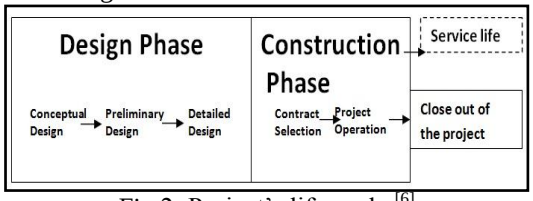

Fig 2: Project's life cycle [6]

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Source: Joanna Goral (2007) Risk Management in the Conceptual Design Phase of Building Projects

At completion of each phase the progress in time is controlled and forthcoming actions are identified.

A. Conceptual Design Phase

The conceptual design phase is the initial phase of the building project. Most important decisions about the planning, organization, design and type of contract take place in this stage. The initial ideas about the project turn out in various concepts. The alternatives are evaluated and the final conceptual solution is chosen.

B. Preliminary Design

After the conceptual design phase, where one concept is chosen, this is further analyzed, taking into consideration technical requirements. More details are considered, a project brief is developed, and preliminary cost estimation is prepared in order to assess the economy of the project and of the chosen solution. The concept is not a ready project in this phase, still detailed studies are going to be done to identify potential risks, plan for a proper organization and prepare a sufficient space for changes.

C. Detailed Design

The detailed design is the next task to solve after the final concept has been chosen and the preliminary design has determined the initial cost and 'constructability' of the project. The designers use information from the final concept evaluation in order to prepare final drawings, select materials, determine component sizes, determine methods of construction et cetera , in order to make the project cleared and ready to implement and construct. The technical specification and requirements together with drawings are the set of documents for potential contractor who is selected in the contractor selection phase.

D. Construction Phase

The selection of a contractor is the initial part of this phase. Depending on the form of the project roles and responsibilities of the contractor are prescribed.
After the contractor has been selected, the necessary agreements, licenses and insurances must be secured. The critical events and risks in this point depend on the type of construction.

The construction phase should be carefully planned and placed in time and duration of the project. Each delay is connected with money, which the contractor has to pay to the client. Monitoring and control of the work progress and the budget are essential parts of the construction phase in order to avoid future problems and punishments according to contract.

E. Closure of the Project

The closure is the final phase of a building project. According to inspections and maintenance should be scheduled before the object is taken into operation. During this phase a pre-final inspection of the building is made by the designer, the client and the contractor. Depending on the project it takes one or few days in order to check or test the individual components or parts of the structure. If some defects are found or need of improvements is identified the contractor has time to make corrections until the final inspection takes place.

In this phase, the final payment to the contractor and cost control completion take place and the certificates of the guarantee are given to the client. It is valuable that the contractor makes feedback visits to the building/structure after some time from the closure of the project, to hear the opinion from the owner about the usage of the owned structure. Such kind of activity gives the possibility to keep the contact between the project participants and may result in further cooperation concerning new projects in the future.

F. Service Life

The service life period is the time when the constructed structure is operated and should be durable and maintained after the building project has been closed and the structure delivered to the client. Service life design prepared in a good way ensures that the durability and intended functions as load-bearing capacity of the structure will last the period as it was assumed in the design phase. The service life design might have a large influence on the economy of the building after the project's completion. Sometimes it is a matter of discussion between the client and the designer whether to use more expensive solutions in the project to ensure a better quality during the service life. The client considers the risk in making such decisions, taking into account the costs of the project and the service life costs in the future.

In figure 3 an example can be seen of how risk and cost of change varies through the time of a project.

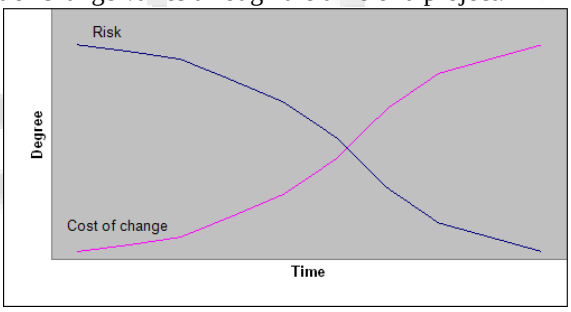

Fig. 3: Project life cycle example of development in risk and cost of change [1]

Source: *Alex Maj Bangsgaard (2010) Method for Risk Analysis in regard of different types of projects*

Figure 3 shows how it typically will be in a project. The closer you get to the end of the project the less risk is associated with it, but at the same time it gets more difficult to make alterations in the project so the cost of change goes up with it.

IV. CAUSES OF COST OVERRUN IN MANY PROJECTS

According to Robert F. Cox, (2007) [8], project owners identified five reasons for project cost overruns: these reasons were, incomplete drawings, poor pre-planning process, escalating cost of materials, lack of timely decisions and excessive change orders. [4]
There are the some Risky factors causes the cost overruns are: [3]

- Lack of information and definitions of scope due to incomplete recognizing or badly developed client's needs and lack of involvement of the appropriate stake holders

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- Lack of value management and Build ability consideration
- Lack of communication and coordination between design participants of different background
- Lack of involving special trades contractors or suppliers during the design development
- Occurrence of mistakes in quantities taking off
- Unavailability of construction cost data to develop a realistic cost estimate
- Unrealistic estimation of construction period
- Inadequate consideration of risks regarding site location and the unavailability of building materials, environmental concerns, weather, market trends, financing burdens, bonds and insurance costs, statutory constrains and other unforeseen risks
- Selection of inappropriate contract type or the inappropriate allocation of risks in contract
- Adopting Tight bidding conditions during tender regarding bonds, insurances or certificates required
- Selection of inappropriate big construction companies with high mark-up and profits added to the presented tender price

V. PREVENTION MEASURES

Managing construction cost is one of the important tasks in achieving successful project completion. Unfortunately it is very seldom achieving effective cost management and often experiencing significant amount of cost overrun. Based on understanding of factors causing cost overrun as identified in previous section, this study proposed a total mitigation measures to control cost overrun factors for achieving effective cost control through interviews. The respondents classified each measure based on three approaches of implementation strategies as proactive, re-active and organizational strategy (Olawale and Sun, 2010) [8]. Measures in Pro-active (Pro) strategy are the measures that must be adopted in the planning stage of project to predict and prevent from the cost overrun issues. Measures in Re-active (Re) strategy are the measures which can be adopted to mitigate the effect of inhibiting factors in project control as a remedy while measures in Organizational (Org) strategies are the measures which are normally in place because of the company's belief, orientation, management style or philosophy; they have a tendency of not being specific to one project but would normally affect all projects. Also, some of the measures are fluid which can be classified in more than one strategy. The results from interviews were analyzed and presented.

VI. CASE STUDY

A. Impact Factor Method (Case-Study-1) [5]

Nida Azhar et al carried out survey in which list of 42 factors was given to the respondents to rank and score them according to the severity on the scale of 1 to 10 and were instructed to rate score 1 to the factors which they find least contributing towards the cost overrun and a score of 10 to those factors they regard as most significant towards generating project cost overruns and rating of in between to mark the severity of factor ranging from low, medium to high. Impact of each factor was then calculated by simple calculation

$$\text{INDEX} = \frac{\sum(\text{fi} \times \text{i})}{\text{n}}$$

Where,

i = is the severity score from 1 to 10

fi = is the frequency of factor getting score i

n = number of response

Rank	Factor ID	Factor Description	Impact	Category
1	1	Fluctuation in prices of raw materials	8.9	Macro-Economic Factors
2	2	Unstable cost of manufactured materials	7.6	Macro-Economic Factors
3	5	High cost of machineries	7.0	Macro-Economic Factors
4	32	Lowest bidding procurement method	6.9	Business and Regulatory Environment
5	42	Poor project (site) management/ Poor cost control	6.9	Business and Regulatory Environment
6	9	Long period between design and time of bidding/Tendering	6.9	Business and Regulatory Environment
7	24	Wrong method of cost estimation	6.9	Business and Regulatory Environment
8	23	Additional work	6.8	Management Factors
9	6	Improper planning	6.8	Management Factors
10	18	Inappropriate government policies	6.6	Business and Regulatory Environment

Table 1: Top Ten Cost Overrun Factors [3]

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