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COST OPTIMIZATION OF CONSTRUCTION PROJECTS BY USING ADVANCE CONSTRUCTION TECHNIQUES AND MATERIALS

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Abstract: Construction industry could be considered as a very important sector for development all over the World and the construction cost is the most important element in it. 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. Time 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 study was carried out to identify the factors affecting construction cost. The factors were identified based on case studies and market surveys.

1.1 INTRODUCTION

This paper presents an introduction on the cost of construction projects. The scope is not only limited to the high-rise buildings but also roads, dams construction etc. This chapter also covers construction process, types of cost, factors affecting cost of projects.

1.2 Construction

Construction is a general term meaning the art and science to form objects, systems, or organizations, and comes from Latin construction (from com- "together" and struere "to pile up") and Old French construction. To construct is the verb: the act of building, and the noun is construction: how something is built, the nature of its structure.

In its most widely used context, construction covers the processes involved in delivering buildings, infrastructure and industrial facilities, and associated activities through to the end of their life. It typically starts with planning, financing, and design, and continues until the asset is built and ready for use; construction also covers repairs and maintenance work, any works to expand, extend and improve the asset, and its eventual demolition, dismantling or decommissioning.

1.3 Construction Industry Overview

Construction industry is an important industry worldwide. The construction industry generally defined as a sector of the economy. The Industry is playing an important role in economic growth of the country, but it faces many challenges currently that lead to affect project goal and steady growth of the economy. Construction is a high hazard industry which comprises a wide range of activities involving plans, design, constructs, alteration, maintains repairs and eventually demolishes of buildings, civil engineering works, mechanical and electrical engineering and other similar works.

financial structure must be adequate to build the design provided, and must pay amounts that Construction is always complex that make industry susceptible to disputes, delays and cost exceeding. The construction industry has characteristics that separately are share by other industries but in combination appear in construction alone.

1.4 Construction Industry Sectors

The construction industry is considered one of the most resource-intensive industry sectors in the global economy and is often exposed to several risks such as resource scarcity, availability, and prices of globally traded commodities. Decreasing the power of assets used in construction is, in this way, critical for expanding industrial and economic resilience.

In general, there are three sectors of construction: buildings, infrastructure and industrial. Building construction is usually further divided into residential and non-residential. Infrastructure, also called heavy civil or heavy engineering, includes large public works, dams, bridges, highways, railways, water or wastewater and utility distribution. Industrial construction includes offshore construction (mainly of energy installations), mining and quarrying, refineries, chemical processing, power generation, mills and manufacturing plants.

1.4.1 Building Construction

Building construction is the process of adding structures to areas of land, also known as real property sites. Typically, a project is instigated by or with the owner of the property (who may be an individual or an organization); occasionally, land may be compulsorily purchased from the owner for public use.

a) Residential Construction: -

Residential construction may be undertaken by individual land-owners (self-build), by specialist house-builders, by property developers, by general contractors, or by providers of public or social housing (e.g. local authorities, housing associations). Where local zoning or planning policies allow, mixed-use developments may comprise both residential and non-residential construction (e.g. retail, leisure, offices, public buildings, etc.).

b) Non-residential Construction: -

This act of the industry primarily addresses the needs of commerce, trade and government and makes up about a third of the total construction market. This is the category that includes banks, schools, office buildings, hotels, shopping malls, religious facilities, basketball stadiums, theatres, universities, amusement parks, hospital, courthouses, government buildings, and other facilities where people gather. These projects may range in size from small medical office to large high-rise office buildings to state-of-the-art biotechnology facilities. The building cost are significantly higher than with residential construction, and the project duration is much longer. It is not uncommon for commercial project last three years or more.

1.4.2 Infrastructure Construction

Infrastructure is composed of public and private physical structures such as roads, railways, bridges, tunnels, water supply, sewers, electrical grids, and telecommunications (including Internet connectivity and broadband access). In general, infrastructure has been defined as "the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions" and maintain the surrounding environment.

1.4.3 Industrial Construction

Industrial construction includes offshore construction (mainly of energy installations: oil and gas platforms, wind power), mining and quarrying, refineries, breweries, distilleries and other processing plants, power stations, steel mills, warehouses and factories.

1.5 Importance of Cost Control in Project Management

When it comes to cost control in project management, it can be challenging to forecast and manage project costs effectively. In fact, there is news every day about construction projects going over budget and time, yet this is avoidable with strong cost management.

Project cost management sets the baseline for project costs. Effective cost management ensures that a project's budget is on track and will be completed according to its planned scope. Without cost control, a company can easily lose money and costs can go above project profit.

There are two types of costs in construction projects: direct and indirect costs. The direct cost is the amount of money spent directly to finish the project (e.g., necessary material, equipment, labor). The indirect cost is the amount of money spent to support indirect completion of the project (e.g., office costs, salaries, general administration). Another way to observe costs is how they appear in different stages with ongoing processes. Planned and estimated costs are the sum of direct and indirect costs over a given period of time. The actual cost is the sum of committed direct and indirect costs on an activity of the project's duration.

Project overrun can dramatically cut margins and profit substantially. In order to minimize and prevent such risks, it is important to pay attention to initial planning. This task can be extremely difficult, as it necessitates a full awareness of everything involved in the field of construction projects.

Another way to reduce project costs is to find work phases that can be done with less money or with cheaper resources. Moreover, as we all know, time is money, so a project period can be shortened, this will obviously help to reduce project costs.

RESEARCH METHODOLOGY

2.1Methodology of the Work

The different phases of this project of work are shown in the following diagram. The figure simply describes the experimental strategy of this study step by step.

a) Review the existing literature for cost optimization of construction projects,

b) Select different construction projects for conducting study with respect to cost and material

c) Study the different factors which are responsible for increasing cost of construction projects,

d) Study of direct and indirect cost for reducing total cost of construction,

e) Study of different cost reduction techniques and advance materials,

f) Comparative analysis of different projects with respect to cost,

g) Interpretation of results and conclusion.

2.2 Cost Reduction Techniques

There are various cost-effective techniques of construction. Many 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. In construction project reduction in cost can be achieved by some of the following techniques:

i. Value Engineering

ii. Material Management

iii. Budgetary Control

iv. Cost Optimization Techniques

v. Cost Reduction Techniques at site

CONCLUSION

In this paper, we have studied different techniques for optimization. To minimize the construction cost and duration at each phase is important. It is a need to meet the present-day requirements and to complete the project within the estimated time, cost, and available

resources. Mainly affecting the factor on cost of project is delay in project and material. Several methods have been developed and applied to analyze the time cost problems, but they can optimize only one parameter. Various low-cost material also suggested for optimizing the cost of project along with maintaining the quality and strength of the project. Also, various mathematical method and software-based models studied for optimization. This study centers on assessing the cost of construction project and compare the construction cost with the optimized cost of the same building by using advance construction techniques and materials. Outcomes of cost study suggest that the construction cost of residential building project is reduced by 20-30%, 10-20% in infrastructural projects and 25-35% in industrial projects than the construction cost.

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