A Review of Cost overruns in Construction Project Management

Miyani Ghanshyam B[1] Lakhani Bhavin G[2] Poriya Gaurav V[3] Prof. Rushabh A. Shah[4] Prof. Nimita A. Tijore[5]

[1,2,3] Final year B.E. Student [4,5]Assistant Professor

[4,5]Department of Civil Engineering

[1,2,3,4,5]S.N.P.I.T. & R.C, Umrakh Bardoli, Gujarat, India

Abstract— In construction industry cost is amongst the major considerations throughout the project management life cycle and thus can be regarded as one of the most important parameter of a project and the driving force of project success. Despite of its proven importance it is not uncommon to see a construction project failing to achieve its objectives within the specified cost. Cost overrun is a very frequent phenomenon and is almost associated with nearly all projects in the construction industry. In this paper different type of cost are enlisted and due to the effect of cost overruns enumerated in building projects. Effects Cost overruns are decrease in the building projects so, different methods are used the analysis cost overruns factors and give the top ten ranks.

Keywords: Classification of Cost, construction industry Cost overruns, Cost under runs, RII, IMPI & AHP Methods

I. INTRODUCTION

Cost is the fundamental component for any construction project. Over the years, there have been improvements in the management of construction projects; however, the problem of cost overrun is still a critical issue in the Construction industry. In construction industry 90% of projects are cost overruns and rarely 10% of projects complete in within budgets and cost under runs. To avoid construction cost overrun, very first and most important step is to identify and understand the causes and factors responsible for that. Managing construction costs includes estimating, scheduling, accumulating and analyzing cost data, and finally implementing measures to Correct construction cost problems. Throughout a project's planning, design, and construction phases, cost management is employed as a means of balancing a project's scope, expectations of quality and budget.

II. CLASSIFICATION OF COST

In the building project mainly two type of cost:

(1) Direct cost
(2) Indirect cost.

A. Direct cost:

Material cost, Equipment cost, Designing cost, Labor cost etc. In material cost like as cement, steel, sand, aggregate, brick, wood, stone etc. Direct purchase cost and hiring cost of different type of equipment. In design cost like as fees of architecture and structural engineer.

B. Indirect cost:

Accident, replacement of equipment and material, fees for legal counsel, slow down the work loss of client's confidence, Insurance premium increase, over time necessitated, facilities of clean up and repair, productive time lost by injured workers and fellow workers, work man's compensation work, administrative work with associated with accident, decrease in morale which may affects productivity[10].

Direct cost is acceptable in cost estimation of building project but the indirect cost is not acceptable in cost estimation so, the main reason of cost overrun is indirect cost. Effect of cost overrun is decrease by reduce the uncertain activity like as accident in construction site. Safety precisions are taking by the contractors, sub contractors and labor. So, reduce the accident in construction site.

In building projects budgets are either overrun or either under run. When project financial managements are good then building projects budgets towards the cost under run and when financial management are poor then building projects budgets towards the cost overruns.

Building projects budgets over runs or under runs are know by ratio of the original cost and actual cost and condition given the both equation.

$$\text{Cost Overrun} = \frac{\text{original cost}}{\text{accutal cost}} > 1$$

$$\text{Cost Under run} = \frac{\text{original cost}}{\text{accutal cost}} < 1$$

III. COST OVERRUN AND IT'S EFFECTS

The different between the **original cost** and **actual cost** when the project is completed is known as **"cost overrun".**

A **cost overrun**, also known as a **cost increase** or **budget overrun**, is an unexpected cost incurred in excess of a budgeted amount due to an under-estimation of the actual cost during budgeting.

Due to cost overrun many effects of the building project like as [4]

(1) Delay.
(2) Additional cost, budget short fall.
(3) Adversarial relationship between participants of the project.
(4) Loss of reputation to the consultant, the consultant will be viewed as incompetent by project owners.
(5) High cost of supervision and contract administration for consultants.
(6) Delayed payments to contractors.
(7) The contractor will suffer from budget short fall of the client.
(8) Poor quality workmanship.
(9) Dissatisfaction by project owners and consequently by end users.
(10) Negative attitude towards the construction industry by the higher public authority and by the society as a whole.

(11) The contribution of the construction industry to the growth of national economy of the country will be less.
(12) Cost overruns in construction projects prevent the planned increase in property and service production from taking place, and this phenomenon in turn affects, in a negative way, the rate of national growth.
(13) Weakens the growth of the construction industry by eroding mutual trust and respect.
(14) Pours money unnecessarily to the project at hand at the expense of other new projects.
(15) Distorts fair and equitable resource distribution.
(16) Discourage investment, the investment on building construction by public clients will be less, hence the number of projects will decrease in the future.
(17) Creates sceptical outlook on appraisal of other new construction projects.
(18) Some project owners (clients) become reluctant to effect additional payments to contractors and they view the cost overrun as a fabricated thing. This will propel to delay the project and become a source of dispute among participants of the project.
(19) Creates frustration on stakeholders.

IV. ANALYSIS METHOD

Three methods are mainly used for analysis a risk factor in building projects:

A. RII (Relative Importance Index) method:

Case Study (A) [1]

Adnan Enshassi et al used questionnaire survey to know the attitude of owners, consultants, and contractors towards the factors affecting the performance of construction projects in the Gaza Strip. Questionnaires were sent to randomly selected owners, consultants, and contractors. Consultants were identified from the listings of consultants association; the target populations of contractors were companies registered with Palestinian contractors union.

The relative importance index method (RII) was used herein to determine owners', consultants', and contractors' perceptions of the relative importance of the identified performance factors. The RII (Relative Important Index) was computed as [6] [2] [9]

$$\text{Relative Importance Index (RII)} = \frac{\Sigma W}{(A \times N)}$$

Where,
W = weight given to each factor by the respondents and ranges from 1 to 5; A – the highest weight = 5;
N = the total number of respondents.

Agreement among the 3 groups of respondents (owners, contractors and consultants), Kendall's coefficient of concordance is used as a measure of agreement among raters. Kendall's coefficient of concordance indicates the degree of agreement on a zero to one scale, and is computed by the following equation. [6]

$$W = \frac{(12U - 3m^2 n (n-1)^2)}{m^2 n (n-1)}$$

Where,
n = number of factors; m – number of groups;
j = the factors 1, 2… N.

Null hypothesis: H0: There is insignificant degree of agreement among owners, contractors and consultants.

Alternative hypothesis H1: There is a statistically significant degree of agreement among owners, contractors and consultants.

Performance	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
Cost	0.679	8	0.724	5	0.726	7
Time	0.753	4	0.757	3	0.769	5
Quality	0.792	2	0.787	1	0.794	3
Productivity	0.736	5	0.718	6	0.747	6
Client's Satisfaction	0.734	6	0.756	2	0.779	4
Regular and community Satisfaction	0.668	9	0.680	9	0.646	10
People	0.759	3	0.712	7	0.812	1
Health and safety	0.698	7	0.686	8	0.699	8
Innovation and Learning	0.821	1	0.744	4	0.804	2
Environment	0.629	10	0.586	10	0.660	9

B. IMPI (Importance Index) technique:

In this technique, for each cause/factor two questions were asked: What is the frequency of occurrence for this Causes and what is the degree of severity of this cause on Project delays both frequency of occurrence and severity were Categorized on a four-point scale. Frequency of occurrence is Categorized as follows: always, often, sometimes and rarely (On 4 to 1 point scale). Similarly, degree of severity was categorized as follows: extreme, great, moderate and little (on 4 to l point scale).

Frequency index: A formula is used to rank causes of delay based on frequency of occurrence as identified by the Participants.

$$\text{Frequency Index (F.I.) (\%)} = \Sigma\, a\, (n/N) * 100/4 \quad (4)$$

Where, as is the constant expressing weighting given to each response (ranges from 1 for rarely up to 4 for always), n is the Frequency of the responses and N is total number of responses.

Severity index: A formula is used to rank causes of delay based on severity as indicated by the participants.

$$\text{Severity Index (S.I.) (\%)} = \Sigma\, a\, (n/N) \times 100/4$$

Where "a" is the constant expressing weighting given to each response (ranges from 1 for little up to 4 for severe), "n" is the frequency of the responses, and "N" is total number of responses.

Sr. No.	Group	RII	Rank	IMPI (%)	Rank
1	labor	0.704	1	35.24	1
2	Materials	0.698	2	33.82	2
3	Design	0.684	3	29.64	6
4	Equipment	0.664	4	24.14	8
5	project	0.662	5	32.62	4
6	contractors	0.653	6	32.26	5
7	Developer	0.644	7	33.64	3
8	Consultant	0.6168	8	29.6	7
9	External	0.553	9	22.3	9

Importance index: The importance index of each cause is calculated as a function of both frequency and severity indices, as follows:

Importance Index (IMP.I.)(%) = [F.I. (%) × S.I. (%)]/100

Case study (B) [4]

This paper identifies the causes of delays in residential construction projects of Indian Construction industry**.** Total 59 causes were identified under 9major groups. Total 50 respondents comprises of 20 developers, 17 contractors and 13 architects who participated in this field survey. This paper suggests an approach to carry out ranking of Causes of delay by two different techniques: Relative importance index and Importance index based on degree of severity and degree of frequency and also discuss about the ranking of the causes. Results were shows that out of top 10 factors total 5 factors were common in ranking by both methods.

c. Index and rank of causes of groups of delayfactors

1) AHP (Analytic Hierarchy Process):

Case study (C) [5]:

The construction industry is complex industry as it has numerous amounts of parameters that all are needed to be managed for the successful completion of the project. Despite of the various project management techniques it was seen that construction industries were facing huge amount of cost overruns. Thus, construction industry needs judicious attention regarding the cost overruns that are occurring in the construction industry. Present approach has certain short comings and it is improved by application of scientific technique. After studied the an ecdotal literature to analyze the short comings of the present approach, **Analytical Hierarchy Process (AHP)** method was selected to find out the crucial causes of cost overruns that are affecting the successful completion of the project. According to the Analytical Hierarchy Process, Development of the Criteria Framework in Indian context was prepared. After analyzing the various causes, amongst which 10 most crucial criteria that are causing cost overruns were:

[1] Drawings,
[2] Policies,
[3] Increase in Expenses,
[4] Festivals,
[5] Investigation,
[6] Diseases,
[7] Specifications,
[8] Strikes,
[9] Quantity Estimate
[10] Contractors

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