SENSITIVITY ANALYSIS OF RISK FACTORS IN CONSTRUCTION COST MANAGEMENT

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Abstract - *In present condition of construction organization face more than problem during risk factors impact on process of construction. This causes whole construction budget cost are vary compare to actual budget defined in scope planning of construction. In this study this problem solved by risk factors from site to site data collected by questionnaire survey. This data are collected from commercial and residential construction site. In this study use RII index method and severity index method. After this two method analysis find ranking priorities and this priorities are analysis by spear-man rank order. And define correlation between two results and find most affected risk factors on construction cost management and give proper prevention as per find result factors*

Key Words: *construction cost management, sensitivity analysis, Survey, Relative important index (RII), severity index, spar man rank order method*

1. INTRODUCTION

Cost management of a construction project is a vital management assignment which is key to success of the business. Construction project have more than phase during whole execution process. So probability of risk factor affecting on each and every phase of construction project that causes whole construction project cost estimation, cost planning , cost budgeting, and cost control are affected by risk associated factors with large variation hike compare to actual process. According to Philipp Holzmann AG survey, 41% there are incorrect calculation in the calculation of the detriment of the construction site project 22% in preliminary contract aspect and project risk. 30% of the cost estimation is participating during the construction aspect and the only 7% of the force is related to the occurrence. Philipp holzmann can

increase durations by 3% avoid 10% of poor contact (linden 1999). Smith (1999) discovered the expenditure of the evaluation of the key engineering construction project represent only 10% of capital of cost estimation project. However, 80% of the total construction project cost during this period stable. This shows how vital the determination of the primary risks and cost estimation at the initiative of the construction site project.

Actual cost are suddenly rise compare to probable forecasting cost that causes unstable financial condition of builder , project delay, negative cash flow and more important unsatisfied client assurance. So in this situation more important point to find risk factors associated with construction cost management and find appropriate method by reduced effect of risk factors and improve cost management efficiency and assure good reliability at the construction project management of each phase to attach which cost related variable.

2. 0BJECTIVES

- To observation of factors during execution work
- To develop RII index and Severity index following by a questionnaire data.
- To identify most impacted variable and efficient risk factor by sensitivity analysis

3. RESEARCH METHODOLOGY

First to review of literature and research paper find most impacted risk factors on construction cost management. And design questionnaire sheet and collected data extracted in RII index and severity index method. And results are compared by the spar-man rank order method are related to sensitivity analysis.

4. DATA COLLECTION

The target population included civil engineering and buildings construction organization of South Gujarat region of India. The architects, contractors, quantity surveyor, interior designer, structural designer, project manager, site engineer and developers of various residential and commercial construction site work in Surat were targeted for survey.

We distributed over an 80 Questionnaires, out of which we received 60 questionnaires. In first half to tack 30 respondent to analysis of RII index method and second half to tack 30 respondent analysis of severity index method.

A. Relative Importance Index Technique: It is used determine the relative importance of the various causes and effects of risk factors. The same method is going too adopted in this study within various groups (i.e. contractors, project engineers, owner and site supervisor). The five-point scale ranged from 1 (very little degree affect) to 4 (very high degree affect) is adopted and transformed to relative importance indices (RII) for each factor as follows:

$$RII = \quad \Sigma W / (A*N)$$

Where, W is the weighting given to each factor by the respondents (ranging from 1 to 5), A is the highest weight (i.e. 5 in this case), and N is the total number of respondents. Higher the value of RII, more important was the cause of risk factors are impacted on construction cost management.

B. Importance Index Technique -In this technique, for each cause/factor two questions were asked: What is the frequency of occurrence for this cause? And what is the degree of severity of this cause on project delay? 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 1 point scale).

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

$$\text{Severity Index (S.I.) (\%)} = \Sigma\ a\ (n/N) * 100/… (5)$$

Where a is the constant expressing weighting given to each response (ranges from 1 for little up to 5 for severe), n is the frequency of the responses, and N is total number of responses.

D. Spear man rank order Importance index: The importance index of each cause is calculated as function   of both frequency and severity indices, as follow

5. RESULTS

PART – 1 RII Results

Top 10 causes ranked by Relative Importance Index (RII) technique

The relative importance index, RII, was computed for each cause to identify the most significant causes. The causes were ranked based on RII values. From the ranking assigned to each cause of delays, it was possible to identify the most important factors or causes of delays in Indian construction industry.

Base on the ranking, the 10 most important causes of material management by RII were:

Table -1: RII Method Result Generation

SR.NO	RISK FACTOR AFFECTING	RII
1	Uncertainty of resource	0.59
2	Poor quality	0.57
3	Availability of material	0.59
4	Inadequate site investigation	0.60
5	Incomplete design	0.64
6	Material deposit	0.54
7	Material broken	0.56
8	Design error	0.65
9	Natural effect	0.57
10	Disaster effect	0.54
11	Land scrap	0.61
12	Seasonal effect	0.60

Table-2 Severity Index Results Generation

Top 10 causes ranked by severity Index technique

SR.NO	RISK FACTOR AFFECTING	SI
1	Uncertainty of resource	0.53
2	Poor quality	0.60
3	Availability of material	0.63
4	Inadequate site investigation	0.54
5	Incomplete design	0.65
6	Material deposit	0.59
7	Material broken	0.50
8	Design error	0.69
10	Disaster effect	0.72
11	Land scrap	0.68

Table -3: Spear Man Rank Order Method

SR.NO	RISK FACTOR AFFECTING ON	SPEARMAN RANK ORDER COFFICIEANT
1.00	Uncertainty of resource	0.69
2.00	Poor quality	0.92
3.00	Availability of material	0.89
4.00	Inadequate site investigation	0.75
5.00	Incomplete design	0.99
6.00	Material deposit	0.85
7.00	Material broken	0.75
8.00	Design error	0.89
10.00	Disaster effect	-0.62
11.00	Land scrap	-0.35
12.00	Seasonal effect	1.00

6. CONCLUSIONS

- This analysis give most affected factor on construction cost management.
- To increase accuracy of construction costing data calculation including above risk factors prevention.
- To remove risk factors impact on construction process.
- To prevent smoothness in construction cost management.

7. ACKNOWLEDGEMENT

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