

Analysis of Risk in Construction Projects

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ABSTRACT

The construction industry is subject to more risk and uncertainty than any other industry. Most of the participants experience risks in cost and time over runs and many times fail to meet quality standards and operational requirements. Therefore, the need to increase the understanding of risk management. In this project, the qualitative analysis of all types of risks except financial and economical risks in the construction projects is done by 'Risk factor and priority model'. The industry has shifted from risk transfer to risk reduction, current risk management systems are inadequate to manage project risks, and lack of joint risk management mechanisms is the key barrier to adequate risk management. SPSS (Statistical Package for Social Sciences) software is used for statistical analysis of the data collected from respondents. The general methodology of this study relies largely on the survey questionnaire which was collected from the local building contractors of different sizes by mail or by personnel meeting. A thorough literature review is initially conducted to identify the risk factors that affect the performance of construction industry as a whole. The survey questionnaire is designed to problem the cross-sectional behavioral pattern of construction risks in construction industry.

Keywords: Risk, Risk management, Risk assessment, Risk factors, Risk rating, questionnaire survey.

1. INTRODUCTION

Construction projects are initiated in complex and dynamic environments resulting in circumstances of high uncertainty and risk, which are compounded by demanding time constraints. Traditional project management that relies on reactive measures to manage project crises is often ineffective to prevent project failure. Knowing the risks that can potentially cause harm to a project but without a mechanism to prioritize the risks, project management would also face difficulties in allocating adequate resources to prevent the occurrence or mitigate the consequence of project failure. Project Risk Management is a structured approach that focuses on the systematic identification, evaluation and control of project risks. Integrating Project Risk Management into day-to-day project activities, project management can gain significant insights to increase the chance of project success.

1.1 OBJECTIVE OF THE STUDY

To Identify and quantify the risk factors in construction projects and Create the multi factors model for risk in project to finding the risk related problems in projects. Finally to eliminate the technical risk for future based on survey.

2. RESEARCH METHODOLOGY

It is the attention given to the nature and kinds of processes to be followed in a given procedure or in attaining the objective. The methodology of research is shown in the Fig. 1

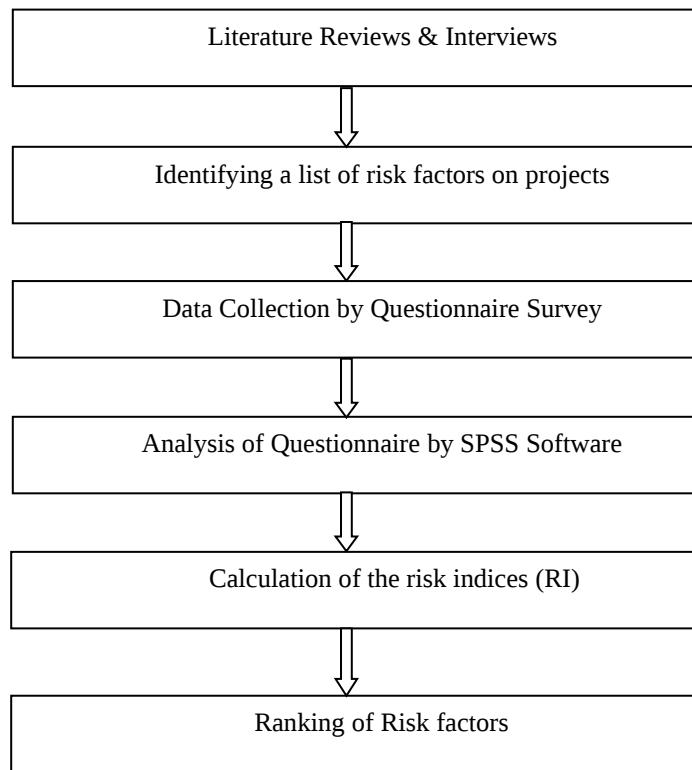


Fig 1: Flow Chart of Research Methodology

2.1 The Factors that Subjected to Risks

The methodology of the study relies largely on a questionnaire survey mailed or given by hand to the local contractors of different sizes. The questionnaire was designed based on the identified risk factors, the impact of risks and the methods to overcome risks. The questionnaire developed assesses the perceptions of contractors by giving the relative importance of risk factors and its impacts towards the building construction project.

2.1.1 Natural risk

Adverse effect due to earth quake, adverse effect due to wind, adverse effect due to landslide, adverse effect due to fire.

2.1.2 Legal risk

Breach of contract by project partner, Lack of enforcement of legal judgment, improper verification of contract documents, Lack of knowledge of arbitration, Uncertainty and unfairness of court justice.

2.1.3 Management risk

Change of Top management, No past experience in similar projects, Short tendering time, Incompetence of sub-contractor, Poor communication between clients, Poor team work, Internal management problems, Project delay.

2.1.4 Market risk

Competition from other companies, Fall short of expected income from project, Increase of accessory facilities price, Increase of labour costs, Increase of materials price, Increase of resettlement costs.

2.1.5 Technical risk

Accidents on site, Design changes, Equipment failure, Failure of hardware/ software, Failure to identify defects, Errors in design drawings, Delay of drawing supply.

2.1.6 Environmental risk

Adverse impact on project due to climatic conditions, any impact on the environment due to the project, un healthy working environment for the workers.

2.1.7 Questionnaire Survey

Questionnaire had been framed using the above factors by Likerts 5 point scale. The survey has been conducted by mailing the questionnaire to Quantity surveyors and Planning Engineers and interviews were conducted for Contractors. There are 43 responses have been received.

2.2 Questionnaire Analysis using SPSS Software

SPSS (statistical package for social sciences) is the software used in statistical analysis of the questionnaire. The analysis yields weighted mean, Standard deviation. The inputs of duration were fed in to the SPSS Window are shown in the figure Fig 2.

2.2.1 Mean Ratio (M)

A mean weighted rating for each factor is computed to give an indication of the importance of the factor.

2.2.2 Calculation of the Risk Factor (RF)

The combined risk measure or the risk factor can be calculated (with probability concept) using the formula,

$$RF = P + C - (P * C)$$

Where;

RF= Risk factor (The term which indicate the risk measure)

P= % value of occurrence (0 to 1)

C= % value of impact (0 to 1)

$P = 0.25 - (0.2 * (2 - \text{occurrence mean value}))$

$C = 0.25 - (0.2 * (2 - \text{impact mean value}))$

2.2.3 Risk Analysis

Evaluate Probability and Impact into FIVE levels: VERY Low, Low, Medium, and High, Very High

2.3 Analysis Results

The frequencies of the responses have been obtained from the analysis. The statistical output obtained from analysis is shown in the Fig 2 & Fig 3. Detailed statistical analysis results are shown in the Table 1.

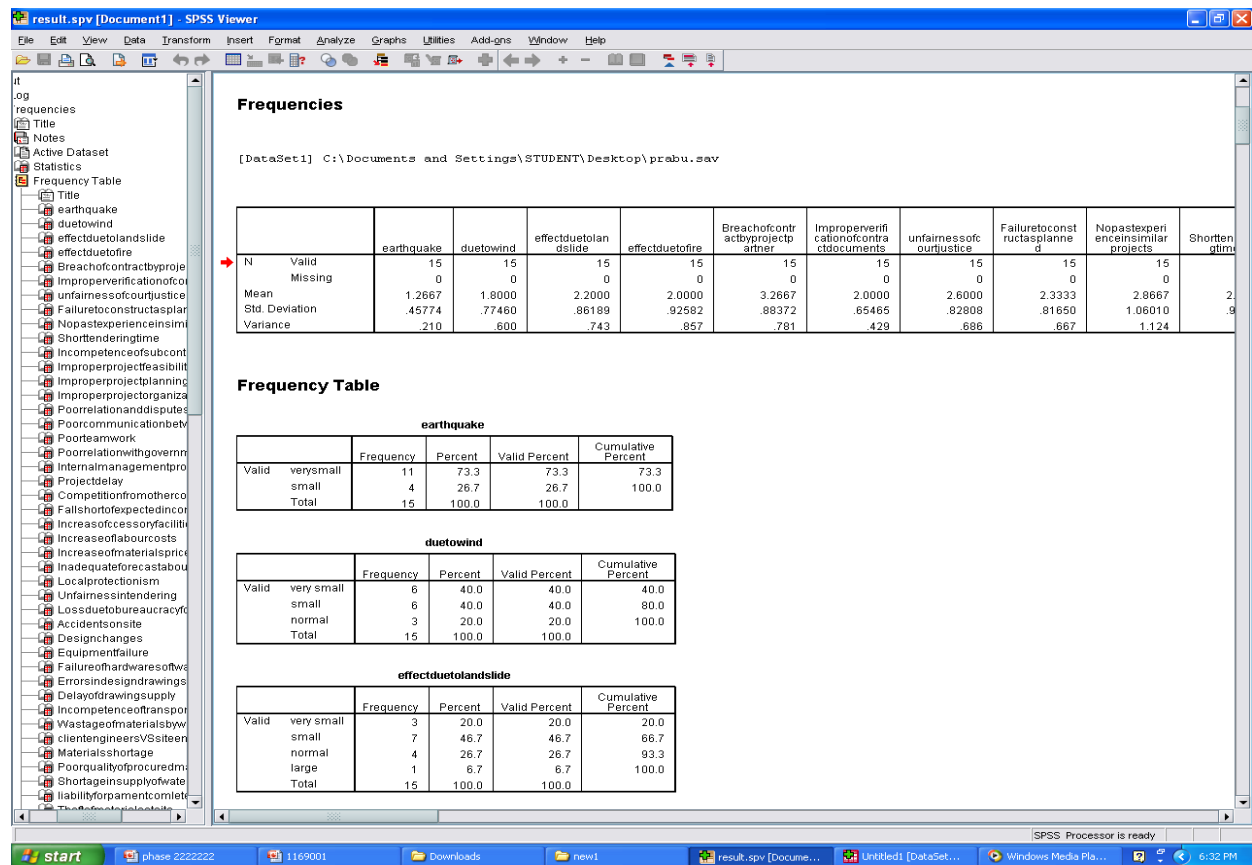


Fig 2 statistical output

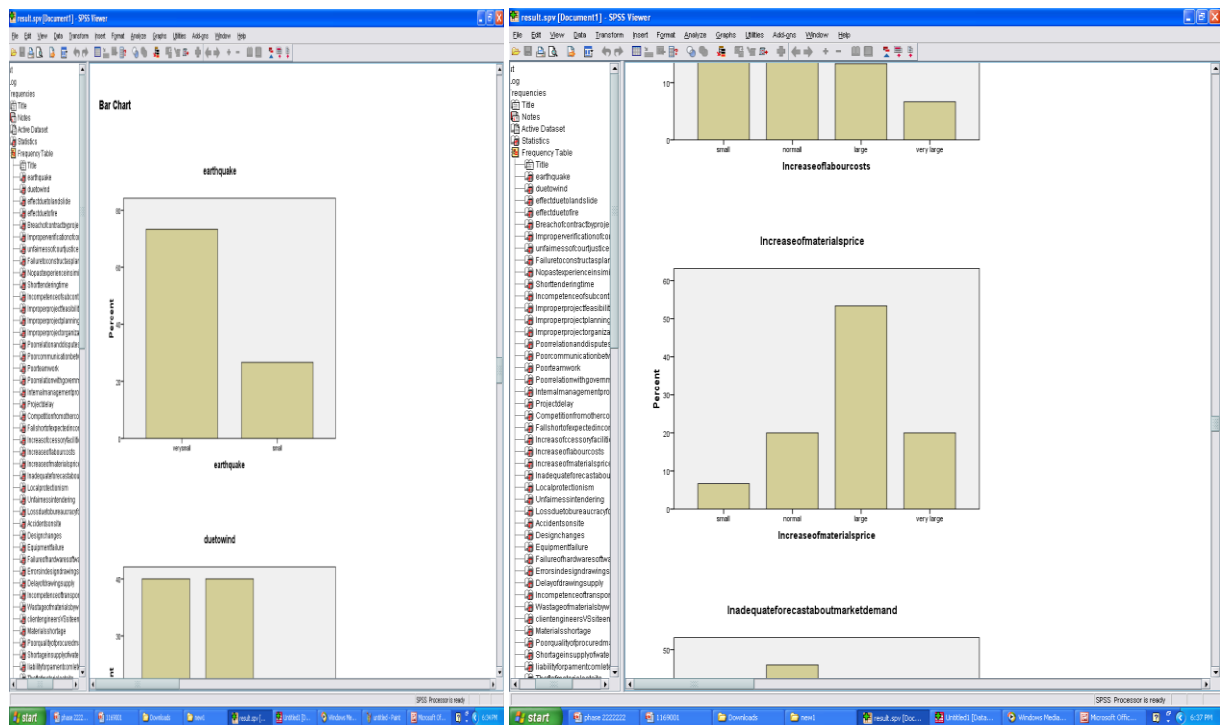


Fig 3: Statistical analysis Results

3. Project Risk Management

Risk management in a project encompasses identifying influencing factors that could potentially negatively impact a project's cost schedule or quality baselines; quantifying the associated potential impact of the identified risk; and implementing measures to manage and mitigate the potential impact. The riskier the activity is, the costlier the consequences if the wrong decision is made. Businesses would like to quantify risk for many reasons. Knowing how much risk is involved will help decide if costly measures to reduce the level of risk are justifiable. It can also help to decide if sharing the risk with an insurance company is justified. Some risks, such as natural disasters, are virtually unavoidable and affect many people. All choices in life involve risk. Risks cannot be totally avoided, but the choice can be made so that risk is minimized.

$$\text{Risk} = \text{Probability of an event} \times \text{impact}$$

4. RESULTS AND DISCUSSION

All the questionnaire survey was done from project managers of the project or project engineer at the site. In some cases, consultant gave the answers on behalf of their clients, both from the owner and the contractor side. Sub-contractor related problems, time constraint, and increase in inflation were the major problems concerned with both the contractor and owner. The full results were shown in the table 1.

Table 1 Overall Ranking of Risks

S/No	FACTORS SUBJECTED TO RISK	MEA N(A)	MEA N(B)	P(% OF A)	C(% OF B)	RF
1	Project delay	2.47	3.39	0.38	0.62	0.766
2	Accidents on site	2.33	3.03	0.34	0.53	0.692
3	Competition from other companies	2.39	2.92	0.36	0.5	0.68
4	Adverse impact on project due to climatic conditions	2.47	2.83	0.38	0.48	0.677
5	Increase of labour costs	2.42	2.81	0.36	0.47	0.664
6	Incompetence of sub-contractor	2.17	2.86	0.3	0.49	0.639
7	Wastage of materials by workers	2.47	2.56	0.38	0.4	0.63
8	Improper verification of contract documents	2.06	2.75	0.27	0.46	0.6
9	Unknown& unforeseen site physical conditions	1.86	2.83	0.22	0.48	0.595
10	Surplus materials handling	2	2.64	0.25	0.43	0.569
11	Change of Top management	1.92	2.67	0.23	0.43	0.566
12	Poor team work	2.22	2.36	0.31	0.35	0.552

As far as the contractor is concerned shortage of skilful workers has the maximum risk rating and other risks which have maximum risk rating are time constraint, sub-contractor related problems, project delay, improper verification of contract documents, and competition from other companies. For the owners time constraint has the maximum risk rating and other risks which have maximum risk rating shortage of skilful workers, project delay, errors in design drawings, Improper project planning and budgeting, loss due to fluctuation of inflation rate. The least risk

rating given by both owners and contactors are environmental risk, relation with government departments, local protectionism and industrial disputes. The standard deviation and mean value of each risks.

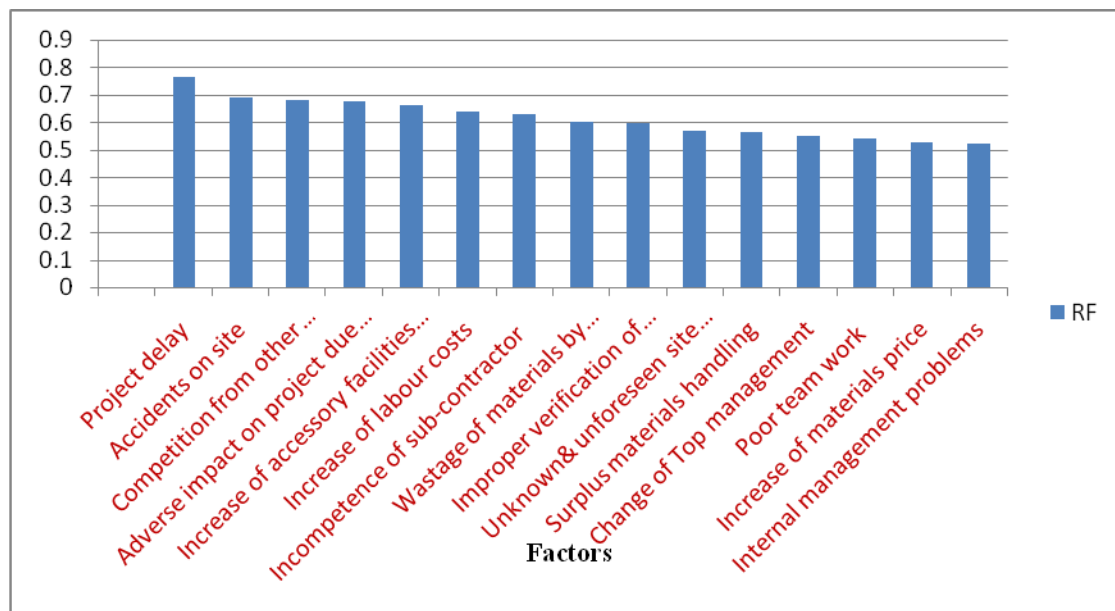


Fig 4: Top Ten Risks

5. CONCLUSION

Detailed analysis of questionnaire had been made using SPSS Software and results were discussed. Finally risk management should be considered a primary tool to assess the project. From the survey we can understand that risk management is not followed in most of the companies as such but if followed also it is not done systematically.

REFERENCES

- [1] He Zhi, "Risk management for overseas construction projects" International Journal of Project Management, 1995,13(4),231-237.
- [2] Shuying Li, "Risk Management for Overseas Development Projects" International Business Research, 2009,2(3),193.
- [3] Taroun, A., Yang, J.B. and Lowe.D, "Construction Risk Modelling and Assessment: Insights from a Literature Review" The Built & Human Environment Review,2003,4(1),134-137.
- [4] Nasir, Brenda McCabe, and Loesie Hartono,"Evaluating Risk in Construction–Schedule Model (ERICS): Construction Schedule Risk Model" Journal of Construction Engineering and Management, 2003,129(5),518-552.
- [5] Mohammad A, Mustafa and Jamal F. Al-Bahar, "Project Risk Analytic Assessment Using the Hierarchy Process" IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT, 1991, 38(1), 45-48.
- [6] Jennifer S Shane, Keith R. Molenaar, Stuart Anderson and Cliff Schexnayder, "Construction Project Cost Escalation Factors" Journal of Management in Engineering,2009,25(4),221-229.

Conflict of Interest

None of the authors have any conflicts of interest to declare.

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