

An Assessment and Analysis of Major Risks in Construction Projects

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ABSTRACT--- *Construction project planning is an essential element in the management and execution of construction projects which involves the definition of work tasks and their interactions, as well as the assessment of required resources and expected activity durations. The study, therefore, examined the awareness of professionals in construction industry of the various types of planning techniques and tools used on construction sites, Questionnaires were administered on selected building professionals (Project Managers, Engineers, Architects), and Contractors and Sub-contractors directly involved in construction work on sites in Lagos State with emphasis placed on planning and the use of planning tools and techniques as major tools for successful project execution. The data obtained were analyzed using the Statistical Package for Social Scientist for Windows (SPSS), and the results were presented by the use of statistical tools such as frequency tables and pie charts. The study shows that there is low awareness on the functional use of construction planning tools and techniques, and recommended that the use of the construction planning tools and techniques should be applied in all building projects and there should be regular adequate training of professionals on the effectiveness and improvement in Information Technology in the construction industry especially in project planning and execution.*

Keywords--- Risk Management , Questionnaire, SPSS

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. Construction industry has changed significantly over the past several years. It is an industry driven primarily by private investors; the presence of securitized real estate has increased considerably. It is vulnerable to the numerous technical & business risks that often represent greater exposures than those that are traditional. Thus risk assessment need arises. Risk assessment is a tool to identify those risks in a project and manage it accordingly with proper treatment. Risk assessment is defined in this study as a technique that aims to identify and estimate risks to personnel and property impacted upon by a project. The general methodology of this study relied 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 was initially conducted to identify the risk factors that affect the performance of construction industry as a whole. The survey questionnaire is designed to probe the cross-sectional behavioural pattern of construction risks construction industry. The questionnaire prepared for the pilot survey was formulated by seeing the relevant literatures in the area of construction risk management

2. LITERATURE REVIEW

Wenzhe Tang, David M.Young (Dec 2007) "Risk Management in the Chinese Construction Industry" studied the empirical Chinese industry survey on the importance of project risks, application of risk management techniques, status of the risk management system, and the barriers to risk management, which were perceived by the main project participants. The study reveals that: Most project risks are commonly of concern to project participants; the industry has shifted from risk transfer to risk reduction

Riaan van Wyk, Akin tola Akintoye (Mar 2007) Akin tola S Akintoye and MacLeod (Mar 1997) "Risk Analysis and Management in Construction" studied the construction industry perception of risk associated with its activities and the extent to which the industry uses risk analysis and management techniques with the help of a questionnaire survey of general contractors and project managers. The author concluded that risk management is essential to construction

activities in minimizing losses and enhancing profitability. Construction risk is generally perceived as events that influence project objectives of cost, time and quality.

Roozbeh Kangari (Dec 1995) "Risk Management Perceptions and trends of U.S Construction" discussed the attitude of large U.S construction firms toward and determined how the contractors conduct construction risk management through a survey of the top 100 contractors. The study showed that in the recent years contractors are more willing to assume risks that accompany actual and legal problem in the form of risk sharing with the owner.

"Project risk management practice: the case of a South African utility company" documented the risk management practice of a utility company for its Recovery Plan project to address the risks of power interruptions. The company's corporate risk management process and its practice at divisional and project levels are discussed. The key role of stakeholders in risk identification, analysis, mitigation, monitoring and reporting is emphasized by the company and this drives its risk management practice.

Florence Yean Yug Ling and Linda Hoi (Dec 2006) "Risk faced by Singapore firms when undertaking construction projects in India" studied the risk that Singapore architecture, engineering and construction (AEC) firms face when working in India and investigated the risk response techniques adopted by them. The risk response techniques include having adequate insurances and careful planning and management.

Robin K Mcguire(Jun 1999) "Analyzing of Risk Factors in Construction" This study helps to make the risk factors involved in construction during and after the construction about the resource allocation, procurement, inventory control. And to minimize the time ,cost and increase in quality of construction by analyzing the risk during planning itself.

J.H.M.Tah and V.Carr (July 2002) "Knowledge Based Approach to Construction Project Risk Management" suggested that consistent methodology for construction project risk management. The construction industry consistently suffers from poor project performance due to a lack of formalized risk

management procedures which helps to facilitate more effective risk management while allowing all project participants to develop and share a great understanding of project risk for improved performance.

Mulholl. B and J.Christian (Feb 1999) "Risk Assessment in Construction Schedules" suggested that a description of systematic way to consider and quantify uncertainty in construction schedules. Construction projects are initiated in complex & dynamic environments resulting in circumstances of high uncertainty & risk, which are demanding time constrains.

3. SCOPE AND OBJECTIVES

- To identify the various risk factors in construction projects.
- The pilot studies were conducted from various reputed companies.
- Using the pilot study the questionnaire is prepared
- The survey will be conducted to the construction industries through questionnaire.

4. METHODOLOGY

The methodology adopted in this project is given below:

- Study of literature related to risk factors
- Preparation of questionnaires.
- Site visit to major construction project.
- Questionnaire survey and personal interviews with Site-Engineers, Supervisor and managers.
- Analyzing the questionnaire.
- Remedial measures are to be suggested and the present data is to be recorded for future reference.
- Conclusions, recommendations and suggestions for future study.

5. DESIGN OF SURVEY

For easy understanding the survey analysis is divided into two part (i.e.) one for the project costing below fifty crores and the other for projects costing above fifty crores. In each category only the first three risks is identified and taken for analysis, since analysing each and early risk will be laborious process. The factors a in the overall survey shortage of skill workers is the main shortage risk faced by the construction firms. Since a large number of cheap unskilled labours are available for work who have migrated to construction industry from various other industries. But as far as the skilled labour is concerned only, few people are available and thus cost of them is very high. To increase the skilled work force the government and the industry people should setup training institutes across the country. Time

constraint is also one of the major risks since construction firms are given a short notice in construction and even penalty is imposed on the construction firms if the project is extended beyond the completion date. Certain Information Technology parks are completed within a very short time, ranging from 8 months to 14 months, which are made in a fast track construction mode. Sub contractor related problems prevail everywhere in the construction industry and in each project. Quality and time are the main reasons for the project delay; this is mainly due to the behaviour of sub – contractors. Competition from other companies is also a major threat faced by smaller firms, since large construction companies project with its financial and technical strength. Planning and budgeting problems is faced both in larger and smaller construction companies, and this risk depends on other factors sub risks. Fluctuation in inflation and a steep rise in the interest rate by banks are current main problems faced by all the sectors of the industry, particularly the construction sector. Communication gap is also a major problem between the clients, since improper communication leads to a bad situation which could have been easily avoided.

5.1 RISK RATING

A Likert scale of 1-5 was used in the questionnaire. A Likert scale is a type of psychometric response scale questionnaire, and is the most widely used scale in survey research. When responding to a Likert questionnaire item, respondents specify their level of agreement to a statement. The scale is named after Rensis Likert, who published a report describing its use. The respondents were required to indicate the relative critically/effectiveness of each of the probability of risk factors and their impact to the management.

5.2 DEMOGRAQHICAL ANALYSIS & RESULTS OF SURVEY

Sl.No	Age	Numbers Of Respondance	Percentage
1	Below 30	8	32
2	31 to 40	6	24
3	Above 40	11	44
	Total	25	100

Table 1: Age of the Respondent

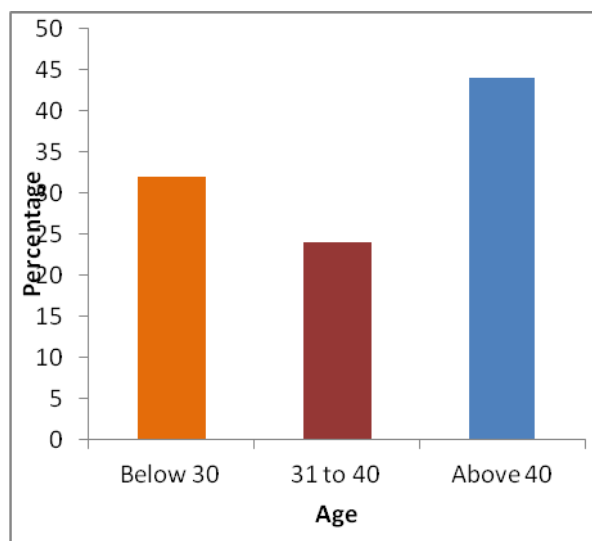


Figure 1: Age of the Respondent

The table reveals that 32 % of respondents are Below 30 years 24 % of respondents are 31 to 40 years, 44 % of respondents are above 40years, so the majority of the respondents are Above 40 years of age

Sl. No	Designation	Numbers Of Respondance	Percentage
1	General manager	3	12
2	Project manager	7	28
3	Project engineer	5	20
4	Site engineer	5	20
5	Others	5	20
	Total	25	100

Table 2: Designation of the Respondent

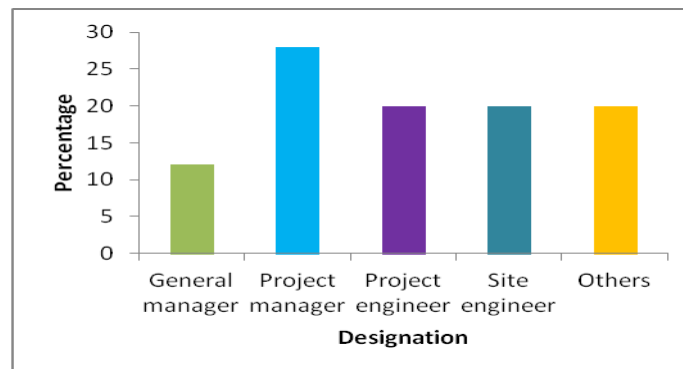


Figure 2: Designation of the Respondent

The table reveals that 12 % of respondents are General Manager , 28 % of respondents are project Manager , 20 % of respondents are Project Engineers , 20 % of respondents are Site Engineers, and 20% of respondents are others, so the majority of the respondents are Project Managers.

Year of experience	N	Percentage
Less than 1 year	0	0
From 1 to 3 years	2	8
From 3 to 5 years	3	12
From 5 to 10 years	7	28
More than 10 years	13	52
Total	25	100

Table 3: Year of experience in construction industry

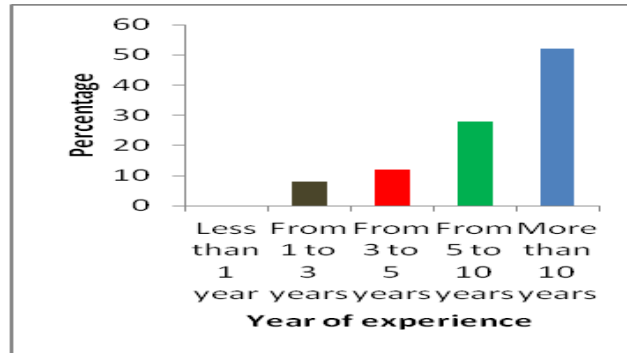


Figure 3: Year of experience in construction industry

The table reveals that 8 % of respondents are 1-3 year of experience, 12 % of respondents are 3-5 year of Experience, 28 % of respondents are 5-10 years of Experience, 52 % of respondents are above 10 years of Experience so the majority of the respondents are above 10 years of Experience in the projects.

	Age	N	Mean	SD	F-value	P-value
Financial Risk	Below 30	8	55.00	7.19	0.534	0.594 NS
	31 to 40	6	59.17	7.83		
	Above 40	11	57.18	7.60		
	Total	25	56.96	7.38		

Table 4: Showing the One-way ANOVA for Financial Risk on the basis of their Age

NS - Notsignificant

The above table clearly shown that the 31 to 40 years of age groups scored higher mean value (59.17) than the other groups. The calculated F-ratio (0.534) to confirmed the mean difference between the two groups, which is Notsignificant. Therefore irrespective of the age group all the respondents have same opinion about the financial risk.

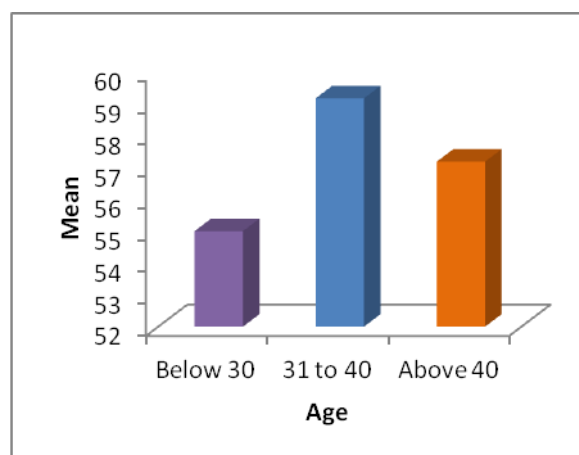


Figure 4: Financial Risk on the basis of their Age

Financial Risk	Designation	N	Mean	SD	F-value	P-value
	General manager	3	61.33	5.77		
	Project manager	7	55.43	10.69		
	Project engineer	5	55.80	4.82		
	Site engineer	5	57.60	3.36		
	Others	5	57.00	9.14		
	Total	25	56.96	7.38		

Table 5: Showing the One-way ANOVA for Financial Risk on the basis of their Designation

NS - Notsignificant

The above table clearly shown that the General manager scored higher mean value (61.33) than the other groups. The calculated F-ratio (0.337) to confirmed that the same mean difference between the groups, which is Notsignificant. Therefore irrespective of the designation of all the respondents have same opinion about the financial risk.

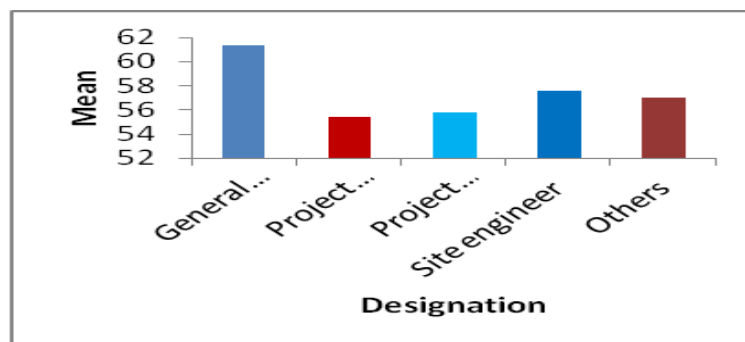


Figure 5: Financial Risk on the basis of their Designation

Financial Risk	Year of experience	N	Mean	SD	F-value	P-value
	Less than 1 year	0	0	0		
	From 1 to 3 years	2	58.00	12.73		
	From 3 to 5 years	3	50.33	8.33		
	From 5 to 10 years	7	59.86	4.81		
	More than 10 years	13	56.77	7.50		
	Total	25	56.96	7.38		

Table 6: Showing the One-way ANOVA for Financial Risk on the basis of their Experience

NS - Notsignificant

The above table clearly shown that there is no mean difference between the groups. The calculated F-ratio (1.214) is to confirmed that there is no mean difference between all the groups, which is Notsignificant. Therefore irrespective of the age group all the respondents have same opinion about the time risk.

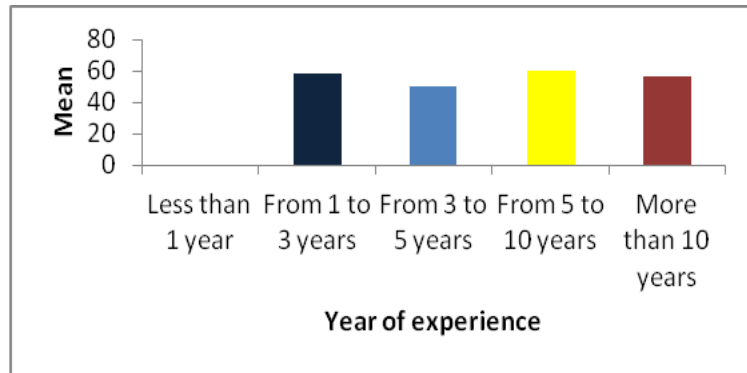


Figure 6: Financial Risk on the basis of their Experience

Time Risk	Age	N	Mean	SD	F-value	P-value
	Below 30	8	49.25	9.63		
31 to 40	6	46.83	4.17			
Above 40	11	50.27	5.16			
Total	25	49.12	6.61			

Table 7: Showing the One-way ANOVA for Time Risk on the basis of their Age

NS - Notsignificant

The above table clearly shown that above 40 years of age group scored higher mean value (50.27) than the other groups. The calculated F-ratio (0.506) to confirmed the mean difference between the two groups, which is Notsignificant. Therefore irrespective of the age group all the respondents have same opinion about the time risk.

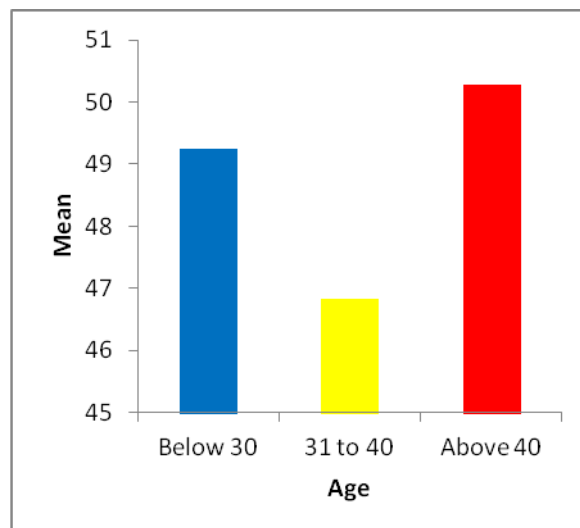


Figure 7: Time management on the basis of their Age

Time Risk	Designation	N	Mean	SD	F-value	P-value
	General manager	3	49.67	2.52		
	Project manager	7	48.43	7.00		
	Project engineer	5	49.40	6.15		
	Site engineer	5	49.80	5.54		
	Others	5	48.80	10.73		
	Total	25	49.12	6.61		

Table 8 : Showing the One-way ANOVA for Time Risk on the basis of their Designation

NS - Notsignificant

The above table clearly shown that there is no mean difference between the groups. The calculated F-ratio (0.036) is to confirmed that there is no mean difference between all the groups, which is Notsignificant. Therefore irrespective of the designation of all the respondents have same opinion about the time risk.

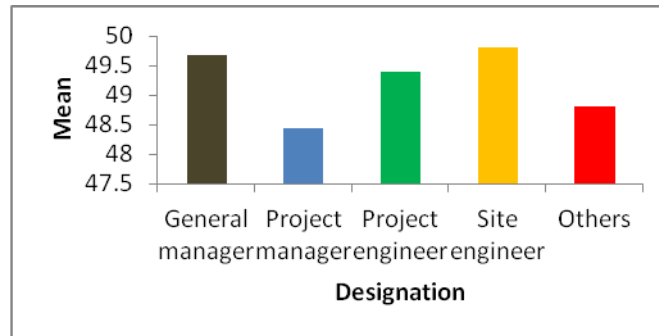


Figure 8: Time management on the basis of their Designation

Time Risk	Year of experience	N	Mean	SD	F-value	P-value
	Less than 1 year	0	0	0		
	From 1 to 3 years	2	45.50	4.95		
	From 3 to 5 years	3	45.67	9.07		
	From 5 to 10 years	7	50.86	8.25		
	More than 10 years	13	49.54	5.52		
	Total	25	49.12	6.61		

Table 9: Showing the One-way ANOVA for time management of the basis of Year of experience in construction industry

NS - Notsignificant

The above table clearly shown that there is no mean difference between the groups. The calculated F-ratio (0.620) is to confirmed that there is no mean difference between all the groups, which is Notsignificant. Therefore irrespective of the age group all the respondents have same opinion about the time risk.

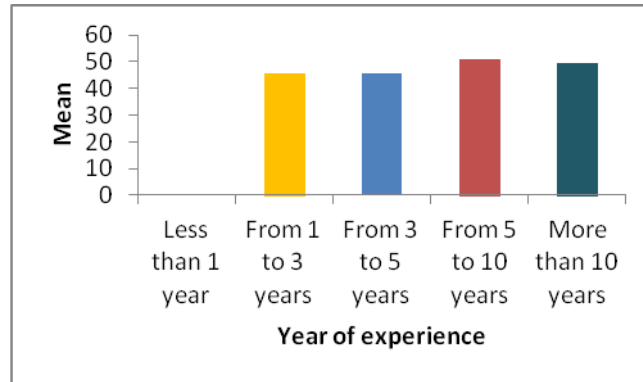


Figure 9: Time Risk on the basis of their Experience

Construction Risk	Age	N	Mean	SD	F-value	P-value
	Below 30	8	33.25	7.21	0.547	0.586 NS
	31 to 40	6	35.83	4.58		
	Above 40	11	35.45	3.75		
	Total	25	34.84	5.16		

Table 10: Showing the One-way ANOVA for Construction Risk on the basis of their Age

NS – Notsignificant

The above table clearly shown that there is no mean difference between the groups. The calculated F-ratio (0.547) is to confirmed that there is no mean difference between all the groups, which is Not significant. Therefore irrespective of the age group all the respondents have same opinion about the construction risk

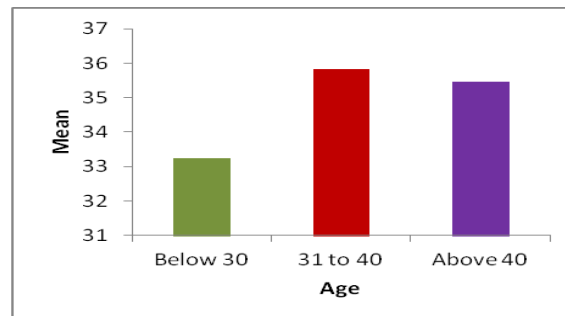


Figure 10: Construction Risk on the basis of their Age

Constructi on Risk	Designation	N	Mean	SD	F-value	P-value
	General manager	3	35.67	4.93	0.163	0.95 NS
	Project manager	7	35.14	4.41		
	Project engineer	5	36.00	4.30		
	Site engineer	5	33.80	4.44		
	Others	5	33.80	8.67		
	Total	25	34.84	5.16		

Table 11: Showing the One-way ANOVA for Construction Risk on the basis of their Designation

NS - Notsignificant

The above table clearly shown that there is no mean difference between the groups. The calculated F-ratio (0.163) is to confirmed that there is no mean difference between all the groups, which is Notsignificant. Therefore irrespective of the designation of all the respondents have same opinion about the construction risk.

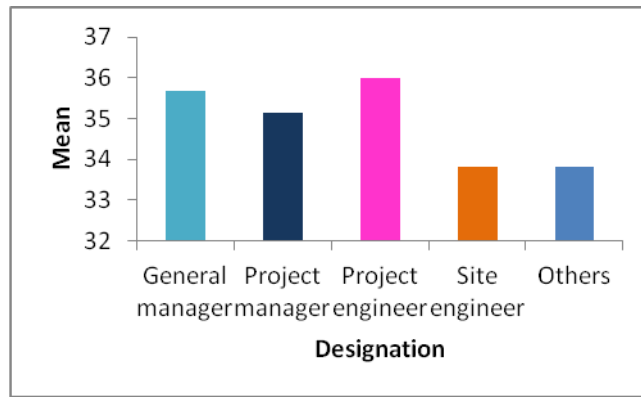


Figure 11: Construction Risk on the basis of their Designation

Construction Risk	Year of experience	N	Mean	SD	F-value	P-value
	Less than 1 year	0	0	0		
	From 1 to 3 years	2	34.50	6.36		
	From 3 to 5 years	3	29.00	10.00		
	From 5 to 10 years	7	36.43	3.74		
	More than 10 years	13	35.38	3.99		
Total	25	34.84	5.16	1.68	0.20 NS	

Table 12: Showing the One-way ANOVA for Construction Risk on the basis of their Experience

NS - Notsignificant

The above table clearly shown that there is no mean difference between the groups. The calculated F-ratio (1.68) is to confirmed that there is no mean difference between all the groups, which is Notsignificant. Therefore irrespective of the experience of all the respondents have same opinion about the construction risk.

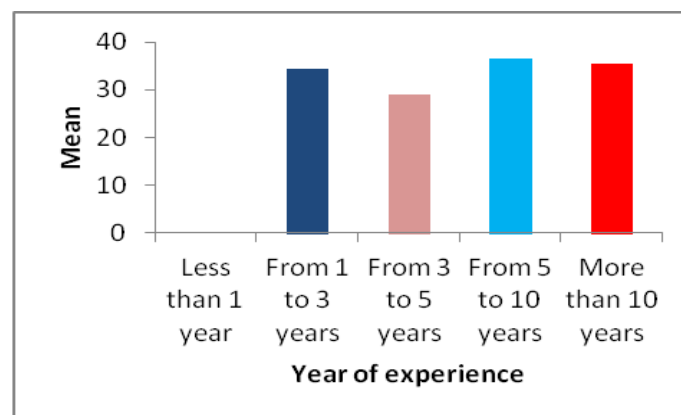


Figure 12: Construction Risk on the basis of their Experience

6. CONCLUSION

As far as India is concerned risk management is still a new word in the construction sector and this should be changed as soon as possible. Currently the Government of India has proposed a risk rating system will help the developers to develop projects at a faster pace by taking quick decisions. Each rating agency will have its own methodology to rate projects. The system will help government to develop a strategy to mitigating risk. This will encourage more response from developers and investors for public-private partnerships projects. It could make the bidding projects more competitive. The system will enable bankers to take

quick decisions for lending finances, which could lead to the financial closure of the project at a faster pace. Third party risk rating would certainly raise critical points, which are not normally raised during finalisation of project

This study should assist management in identifying activities where there is a risk of Financial, Time and Construction aspects and hence provide a basis for management to take objective decisions on the reduction of risk to an agreed level. These findings are very important for implementing further effective measures to ensure the right direction of future development. Risk management should be considered a primary tool to assess the project. Data collected was subjected to 5-scale Impact Grid with Scores of Risk. Those scores were used to determine difference in perceived risks of, General Manager, Project managers, Project Engineers and Site Engineers which was then analyzed by using the software of SPSS using the formulas of ANOVA test and t- test.

Financial Risk:

The analysis clearly shown that below 31 to 40 years of age group scored higher mean value (59.17) than the other groups and the calculated F-ratio (0.534), the Project manager group scored higher mean value (62.33) than the other groups and the calculated F-ratio (3.677). The 3 to 5 years of experience group scored higher mean value (62.00) than the other groups and the calculated F-ratio (3.685).

Time Risk

The analysis clearly shown that above 40 years of age group scored higher mean value (50.27) than the other groups and the calculated F-ratio (0.506), the site Engineer groups scored higher mean value (49.80) than the other groups and the calculated F-ratio (0.036), the 3 to 5 years of experience group scored higher mean value (120.40) than the other groups and the calculated F-ratio (4.109).

Construction Risk

The above table clearly shown that below 31 to 40 years of age group scored higher mean value (35.83) than the other groups and the calculated F-ratio (0.547), the Project engineer groups scored higher mean value (36.00) than the other groups and the calculated F-ratio (0.163), the 5 to 10 years groups scored higher mean value (36.43) than the other groups and the calculated F-ratio (1.68).

This will encourage more response from developers and investors for public-private partnerships projects. It could make the bidding projects more competitive. The system will enable bankers to take quick decisions for lending finances, which could lead to the financial closure of the project at a faster pace. Third party risk rating would certainly raise critical points, which are not normally raised during finalisation of project

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