

A STUDY ON RISK MANAGEMENT PRACTICES IN CONSTRUCTION PROJECTS IN TAMIL NADU (COMPARATIVE PILOT STUDY: PROJECT OWNERS, EPC, OEM, SUBCONTRACTORS)

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Abstract

Risk differs with enterprise to enterprise. Therefore, the risk management also varies with the enterprises by its role and categories of business. The Pilot study aims to identify the risk awareness, risk management practices and risk associated with categories of companies involved in the construction projects. Mainly 4 categories of companies generally involved in any construction projects. They are *Project owners* which generates revenue from its service or operations, *Engineering Procurement Construction companies (EPC)* which owe contract from project owner for execution of contract, *Original Equipment Manufacturers (OEM)* which supplies products/ Equipment's to Project owner/EPC firms, *Subcontractors firms* which owe & execute subcontracts from EPC firms for project Execution. Each category of company's risk are different and risk management practices are different due to its scope, volume of work, risk elements and expertise involved therewith. Henceforth it stands as significant to find the difference interlinked with it. Total 200 Respondents, 50 respondents of each category were responded in this survey. The Results shows that that Project owners and EPC Firms mostly try transfer the risk to others and pay the cost to minimize their impacts. OEM have more concerns on their risk such as Specification changes & manufacturing clearance, failures in factory acceptance test, defects on transits, defect liability during warrantee and guarantee period. OEM manages risk through Clear understanding of Customer requirements and design obligations, Compliances of specs, standards & deviance matrix, Cost provision for ratification of deviations, Data base of Product Specs, quality, standard, defects probability, (FMEA) Failure mode effect Analysis, Ensuring the availability of spares and strengthening production facilities etc. Subcontractors have more concerns on their risk Cost overrun due to delays on readiness or other impacts, Lack of experienced staff & manpower, Ratification of Errors during construction/services rendered, under-estimated volume of work, Lack of adequate workers to

perform activities. Subcontractors manages their risk through keep provision in offer price, Invoicing for idle hours, effective use of planning, staffing, consumables, and proper Tools.

Keywords: *Risk Management, Construction Projects, RMP, Enterprise risk, Tamil Nadu*

INTRODUCTION

Risk is common to all organization. But it is significant in construction industry. Since, construction projects will involve various companies to accomplish the project deliverables. The Project deliverables will differ with contract packages and scope of works will differs with contract packages. Therefore, the Risk is also bifurcated with contract packages of projects. Turnkey projects will have higher risk in overview. The Project Owner organization will have the overlook on overall risk whereas's the contract package contractor's EPC will have the risk over their scope of works. The project organizations will split the risk and transfers to contractors through the contract terms and conditions as a part of their risk management practice to suppress their overall risk. The Engineering Procurement Construction (EPC) contractor will owe the risk of their contract package scope of works and transfers their defined risk to original equipment manufacturers and subcontractors to limit their risk. Hence therefore, the risk level, cost of risk and mitigation cost of the risk will differ with type of organization, scope of works and volume of risk involved in it. However, the project will have different perspective from different participant involved to execute. The end-user role is more vital to make the chain of action to integrate everyone together to accomplish their revenue from the project operations. The project cost, project risk and its management will be different for Project owners, EPC contractors, Original Equipment Manufacturers, and subcontractors. Despite of type of companies & their business, Risk plays a main role for all concerns and therefore risk management practice helps them to prevent the organization from unwarranted insolvency and bankruptcy issues. Tamil Nadu is one of the renown states of India which known for its worldwide famous engineering marvel construction like kallanai (Dam) located in Trichy and Tanjore Brihadeeswara Temple. The comparative study was carried out to analyses the risk perspective in construction projects amid construction companies relevant to it type, business, contracts, and project owners in Tamil Nadu. This study aims to evaluate the risk level, risk management practice and awareness in Project Owners, EPC firms, Product Manufacturers, and subcontractors.

REVIEW OF LITERATURE

Debasis Sarkar and Goutam Dutta (2011) were developed a framework of project risk management for the underground corridor construction of metro rail. They classified 21 risk as follows, feasibility risk, pre-execution project risk – design, technology, execution risk-traffic diversions, utility diversion risk, risk in survey works, solider & king piling risk, timber lagging works, soil excavation work, rock blasting, installation of construction deck, installation of steel structs , installation of rock anchors, shot-crating & rock bolting works, subfloor drainage works, water proofing works, diaphragms wall construction, top down construction, permanent structure works, mechanical & electrical installation, backfilling & restoration works.

Aneetha Vil Venthani and Satyanarayana N.Kalidindi (2012) were identified approval risk in transportation infrastructure projects in India. The approval process needs to be carried out on the sequence of detail project report, external finance committee, public investment board, ministry of finance, cabinet working committee for economic affairs, state pollution control board, central pollution board and ministry of environment & forests for project clearances.

Weizhou Li, Zhongju Feng, Dongliang Xun, Shengrong Zuo, Xiaojun Che, Yang Wang and Chen Cheng(2013) were assessed risks during large span steel truss arch bridge construction. Major risk type identified by them are construction technique risk, material & equipment risk, contract risk, economic risk, political & law risk, personnel risk and natural disasters risk.

Mario Dakovic and Miro Hegedic (2014) were carried out a detailed review of risk management approaches in oil & gas onshore constructions project, they conducted a detailed case study & represented a risk management process with risk register approaches to identify the risk category maps showing the contingency & realization with risk registers as effective tool.

Ahmad Baghdadi and Mohammed Kishk (2015) were identified several risks and their consequences occurred in Saudi Arabian aviation construction projects, as per their results they have identified Fifty-Four (54) Risks in their study under three categories as follows, Internal risk, External risk and force majeure risk.

Dae-Woong Shin, Yoonseok Shin and Gwang-Hee Kim (2016) were conducted an intensive risk assessment for Nuclear construction project and identified four (4) major risks distributed in process, cost, safety and quality.

Imayanti Basari (2017) has carried out a study on estimation risk of high-rise building contractor. Basari made a risk event calculation as the result 69.23% for the contractor failure to meet the obligations due to internal factors, 57.6% for must implement any variation, 53.85% due to owner failed to pay due to financial limitations.

Piotr Tworek, Seweryn Tchórzewski and Petr Valouch (2018) were carried out a case study on risk management of coal - mines. They identified the major sources of risk in coal mine projects are Natural calamities¹(Methane, rock burst, Co₂, coal, water), Technology²(effective machines & equipment, safety negligence, incorrect machine operations), Manpower³(insufficient preparation, Human errors, lack of knowledge) and Organization⁴(incorrect & poor project definition, finance, communication procedures & industrial actions, etc).

Gavit Shivamkumar Chandubhai, Jayeshkumar R. Pitroda and Prof. Ashish H. Makwana (2019) were conducted a review on risk management in high-rise construction project. They have concluded combined method of qualitative and quantitative can be used to identify the risk. The Major risk identified by them are technical, financial, physical & constructional risk. The results of risk factor affect overall productivity which will lead to time- overruns and cost- overruns.

F.J Joubert and L Pretorius(2020) were done a case study on design & construction risk for a shipping port and container terminal. They had made checklist of (215) two hundred and fifteen different risk along with Risk breakdown structures. The checklist has been categorized as follows (A) Breakwater (design(6) & construction(56)), (B) Reclaimed land (site conditions(3), construction (22)), (C) Entrance Canal & Basin (Design(3), construction(4)), (D)Quay (Design(6), construction (34)), (E) Building & container yard (Design (15), Construction (18)),(F) Power Supply (Design (5), Construction(6)),(G) Project Management office (Permitting & site access (6), Planning & schedule management (6), Scope Management(7), Commercial Management (8), Quality management(2), Human resource management (4), Health & safety Environment (4)) under category (A) to (G) – 215 Checklist has been prepared by them as per work breakdown structure elements.

OBJECTIVES OF THE STUDY

- To conduct a pilot study to compare the major risks of Project owners, Engineering procurement Contractors, Original Equipment Manufacturers and Subcontractors in Tamil Nadu.
- To identify risk level or volume for Project owners, Engineering procurement Contractors, Original Equipment Manufacturers and Subcontractors in Tamil Nadu.
- To identify risk management awareness and risk management among 4 categories of the companies involved in construction projects in Tamil Nadu.

Simple percentage analysis used to identify and measure the risk awareness, risk impacts, risk management practice adopted in Project owner firms, EPC, OEM & Subcontractors firms.

METHODOLOGY

This pilot study has been conducted in Tamil Nadu among 4 categories of the companies involved in construction industry through questionnaire survey. Random sampling method is used in this study. The data collected from total of 200 respondent randomly and response were analyzed & interpreted through percentage mentioned in Tables and Figures. The equal no of respondents has taken to maintain unbiased Participation % percentage of respondents for comparative analysis. However, the significance of the study is to compare the risk which differs among 4 categories of the companies.

RESULTS & FINDINGS

Summary

Table 1. Demographic Information of Respondents &Results

<i>Profile of Respondents</i>	<i>Number of Re-spondent</i>	<i>%Percentage of Respondent</i>
Project Owners	50	25%
Engineering Procurement Construction Companies	50	25%
Original Equipment Manufacturers	50	25%
Subcontractors	50	25%
Total	200	100%
<i>Experience level of Respondents</i>	<i>Number of Re-spondent</i>	<i>%Percentage of Respondent</i>
0-5 Years	32	16%
5-10 Years	37	18.5%
10-15Years	40	20%
15-20 Years	47	23.5%
Above 20 years	44	22%
Total	200	100%

Table 2. Risk Management Awareness and Risk Management Practice

<i>Risk Management Awareness & Risk Management Practice Score</i>	<i>Number of Re-spondent</i>	<i>%Percentage of Respondent</i>
LOW LEVEL	Score 0-1	8.5%
	Score 1-2	11%
	Score 2-3	10%
MEDIUM LEVEL	Score 3-4	10%
	Score 4-5	11.5%
	Score 5-6	11%
HIGH LEVEL	Score 6-7	12%
	Score 7-8	11%
	Score 8-9	9.5%
	Score 9-10	5.5%
Total	200	100%

SURVEY QUESTIONS & RESPONSES

Please select your company business profile

200 responses



Please select your experience level / Years?

200 responses

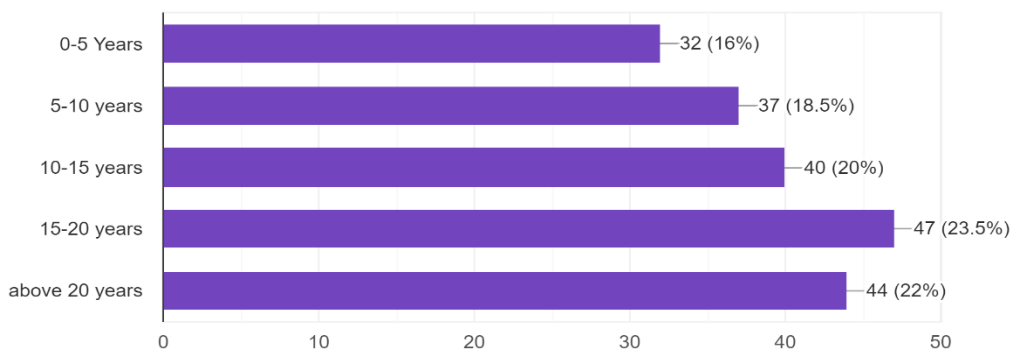
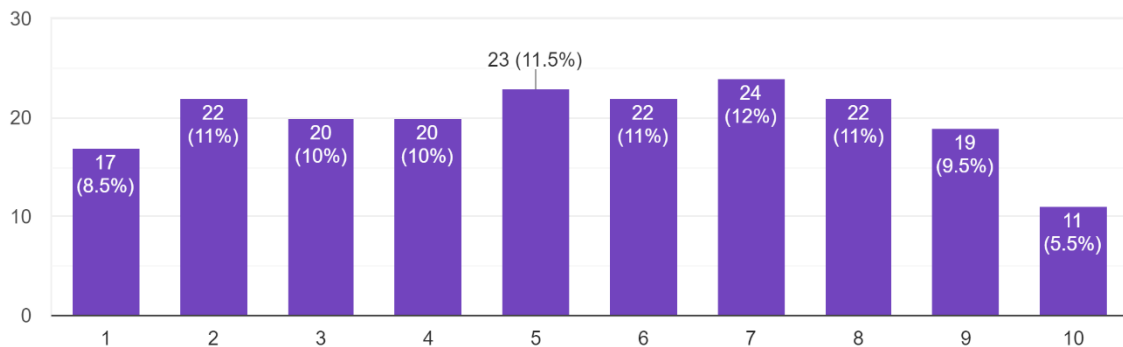


Figure 1

SURVEY QUESTIONS & RESPONSES

Please rate the score for the risk and risk management practice awareness in your organizations

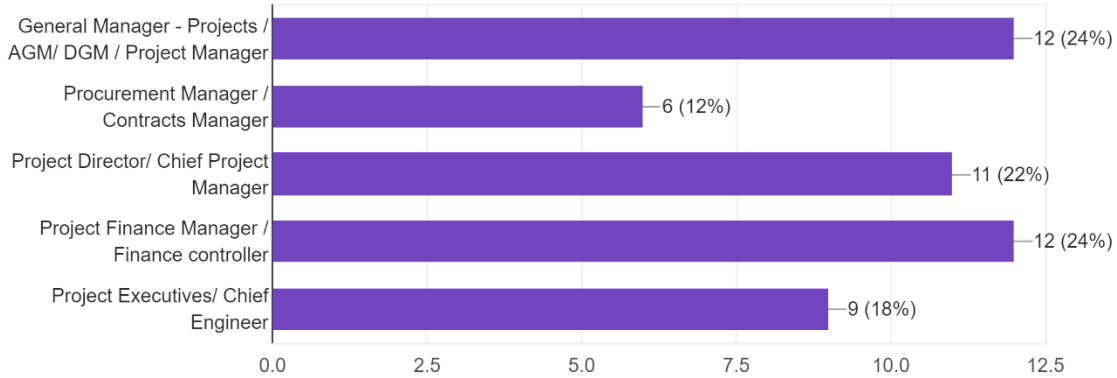
200 responses



SURVEY QUESTIONS & RESPONSES -PROJECT OWNERS

What is your level of Position in your organization?

50 responses



Which of the below option your organization use to manage the risk?

50 responses

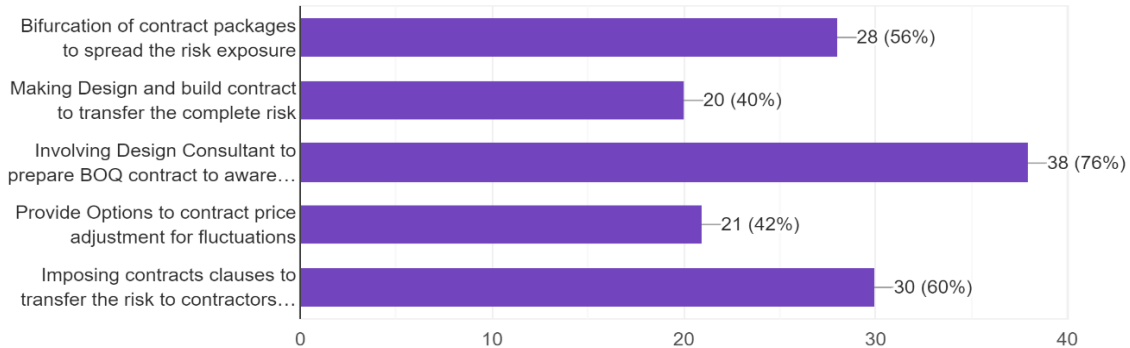
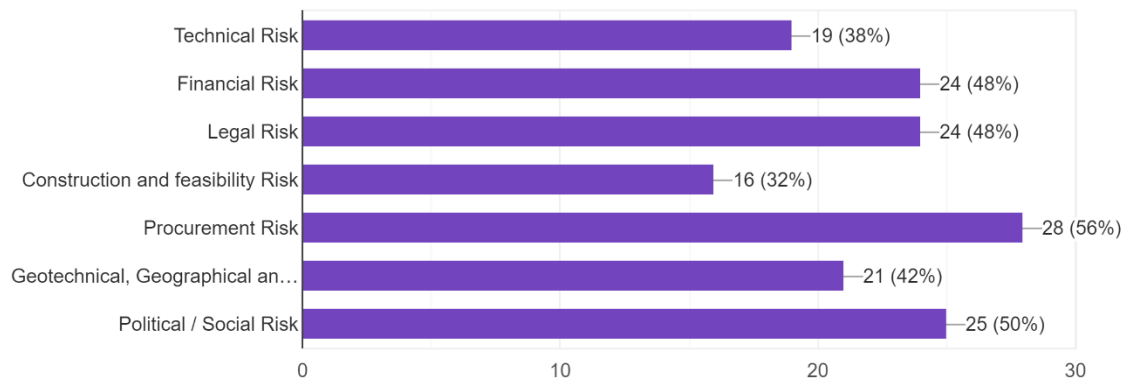


Figure 2

SURVEY QUESTIONS & RESPONSES -PROJECT OWNERS

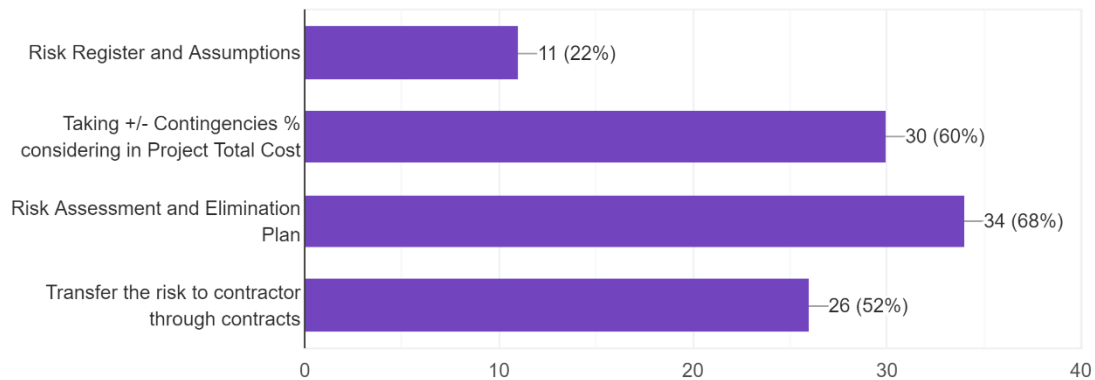
Which of the below risk your organization most concern or treat as high level of risk?

50 responses



Which on the following management practice used in your organization to manage risk?

50 responses



Which of the following will concerns in your Risk Management review ?

50 responses

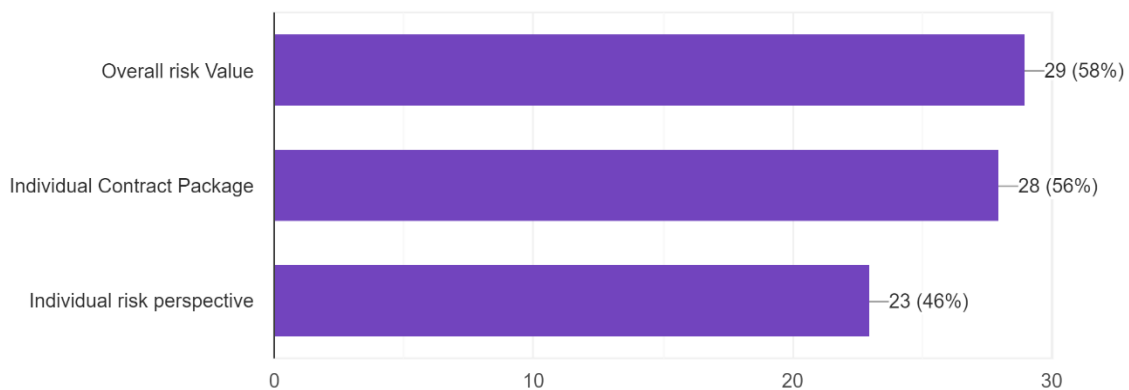
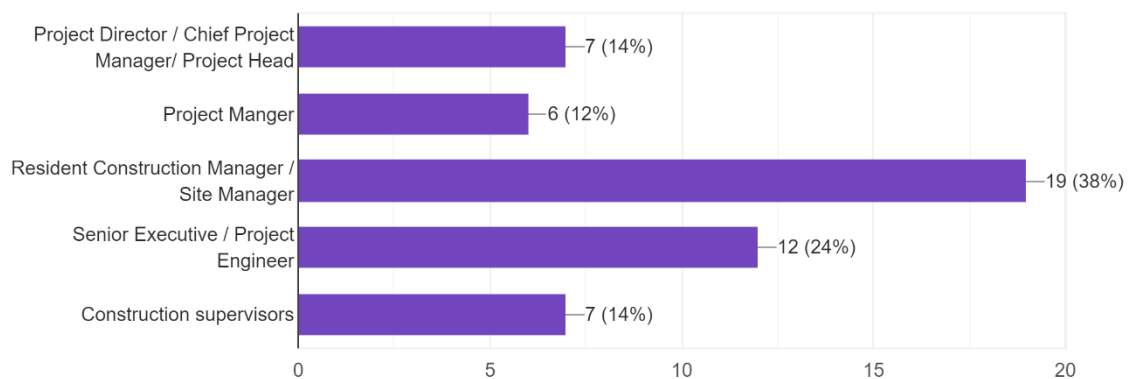


Figure 3

SURVEY QUESTIONS & RESPONSES - EPC FIRMS

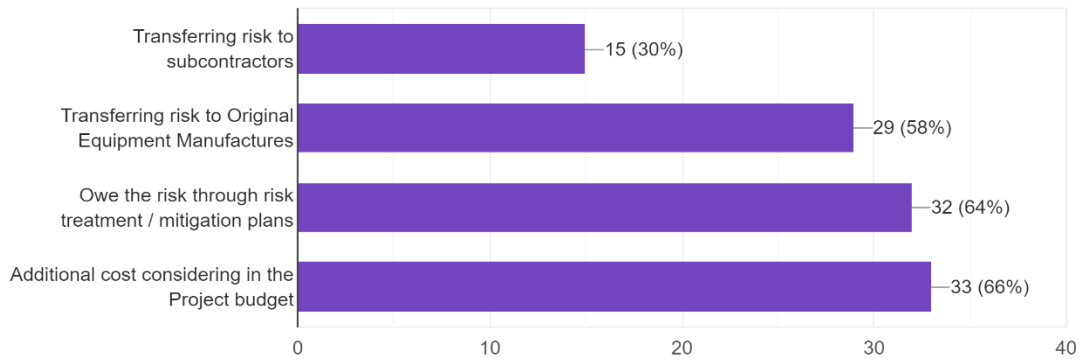
What is your level of Position in your organization?

50 responses



Which of the below option your organization use to manage the risk?

50 responses



Which of the below risk your organization most concern or treat as high level of risk?

50 responses

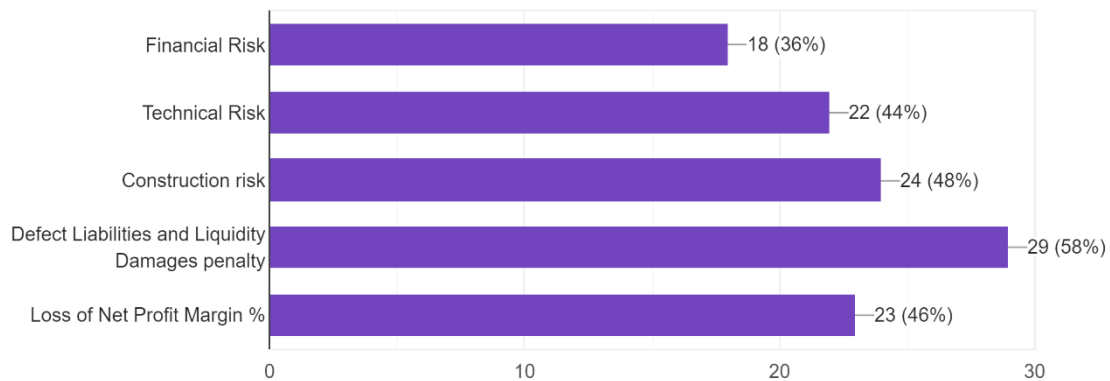
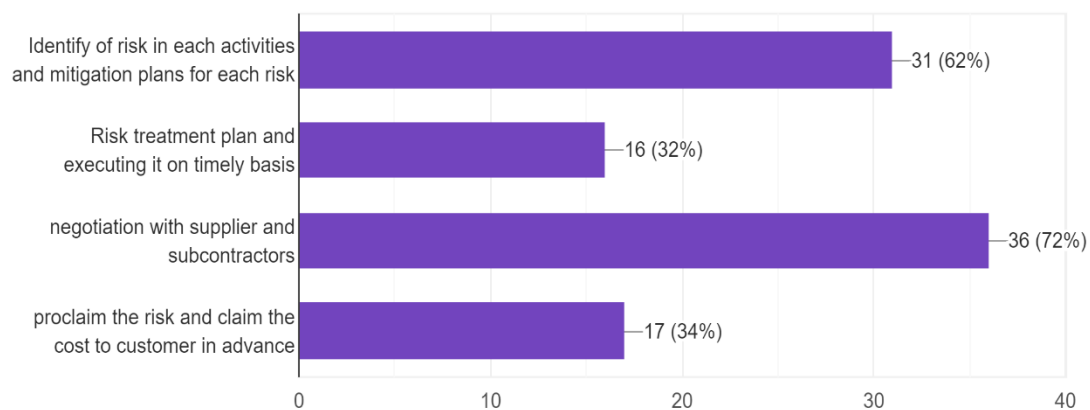


Figure 4

SURVEY QUESTIONS & RESPONSES - EPC FIRMS

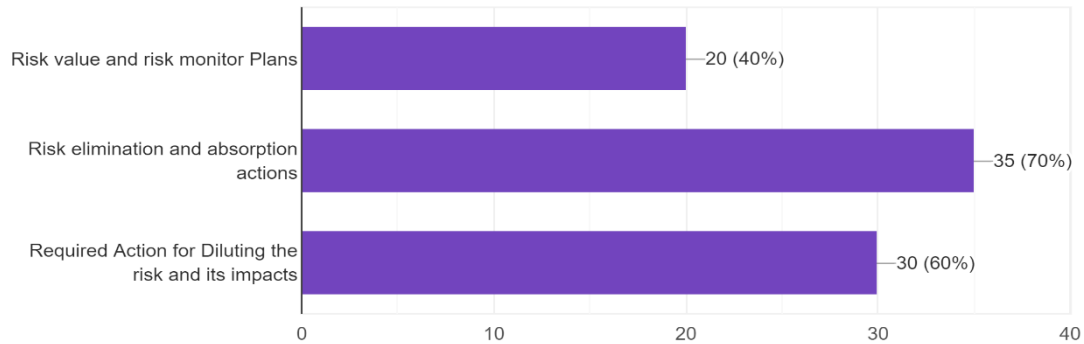
Which on the following management practice used in your organization to mänge risk?

50 responses



Which of the following will concerns in your Risk Management review ?

50 responses



SURVEY QUESTIONS & RESPONSES -ORIGINAL EQUIPMENT MANUFACTURERS

What is your level of Position in your organization?

50 responses

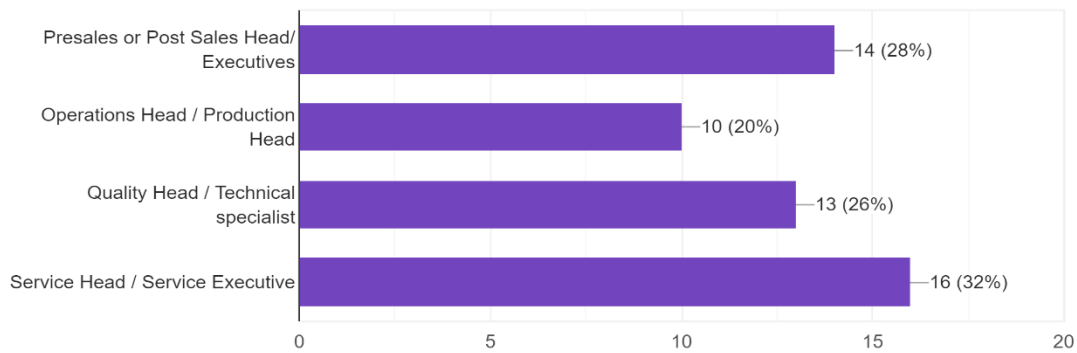
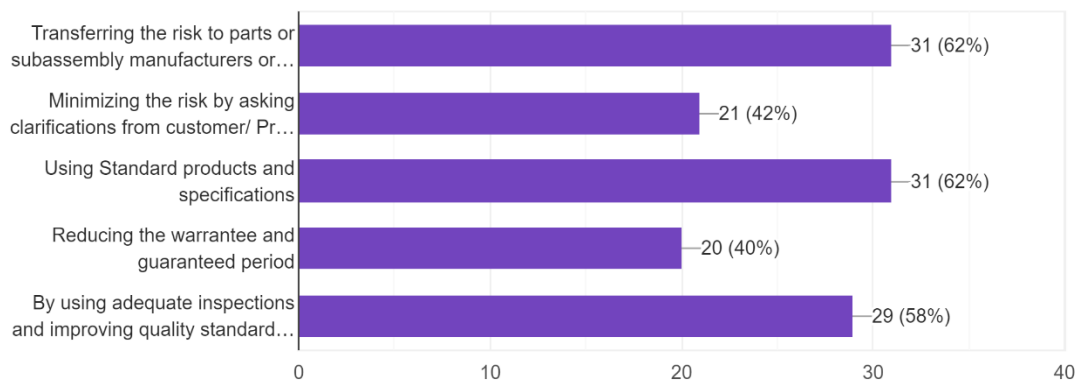


Figure 5

SURVEY QUESTIONS & RESPONSES -ORIGINAL EQUIPMENT MANUFACTURERS

Which of the below option your organization use to manage the risk?

50 responses



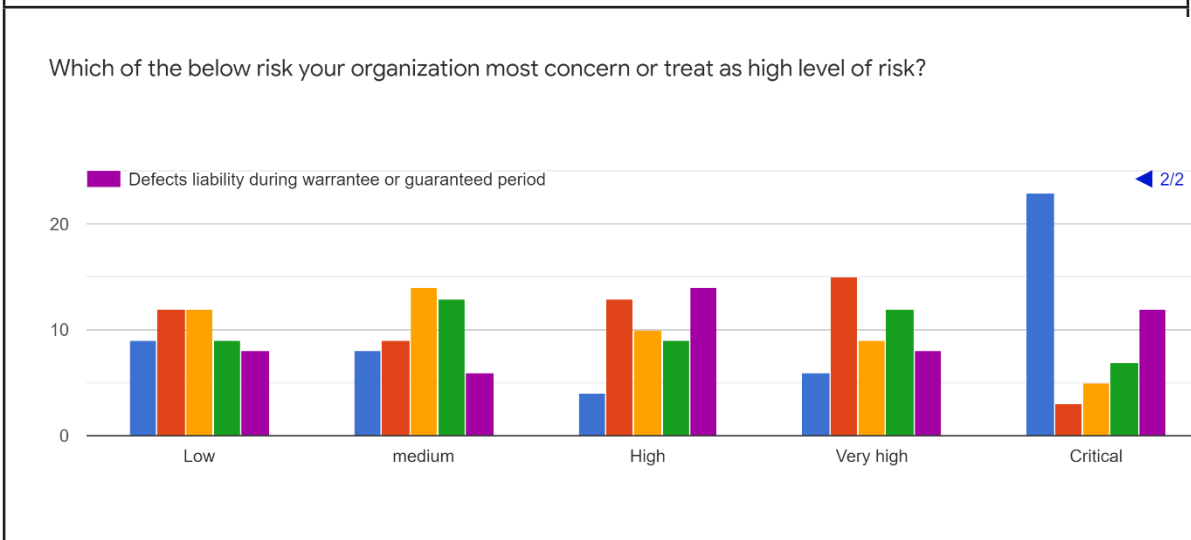
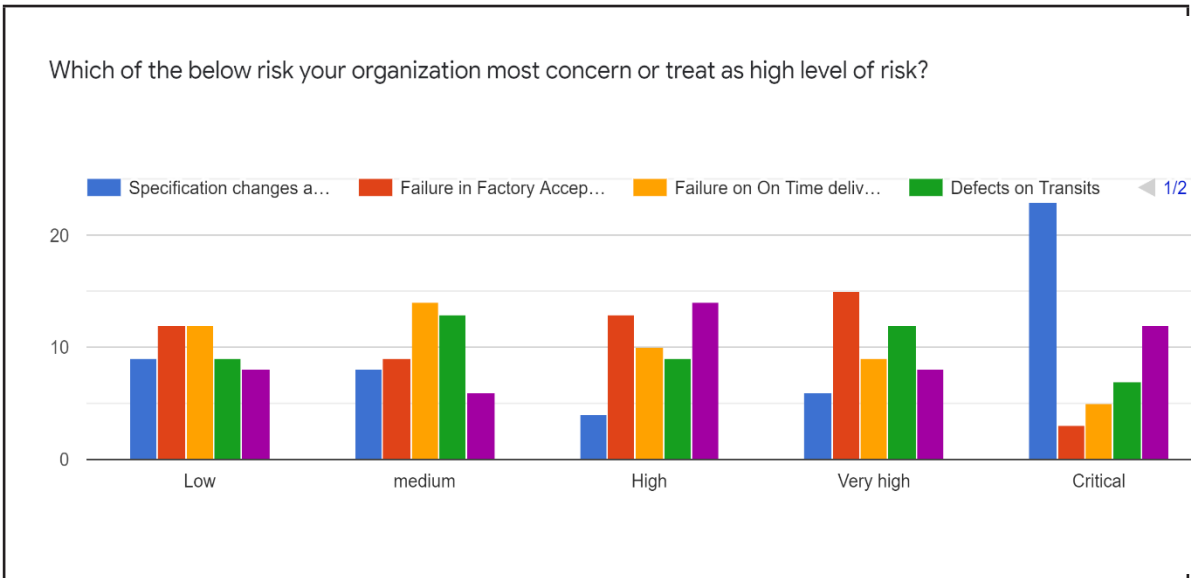
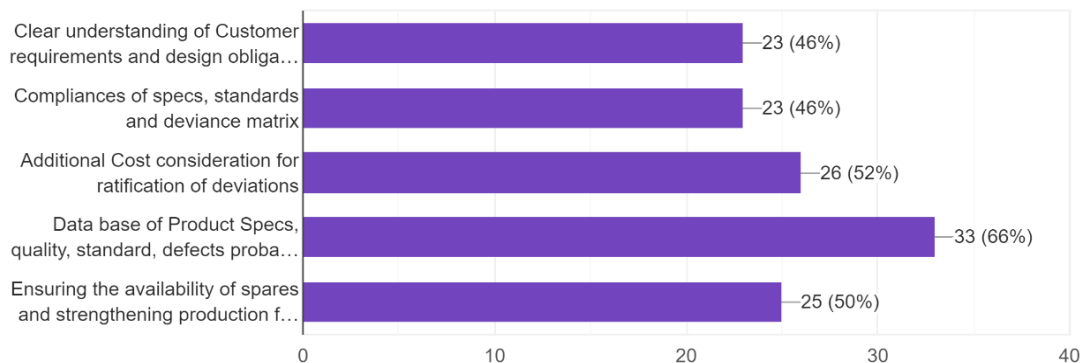


Figure 6

SURVEY QUESTIONS & RESPONSES -ORIGINAL EQUIPMENT MANUFACTURERS

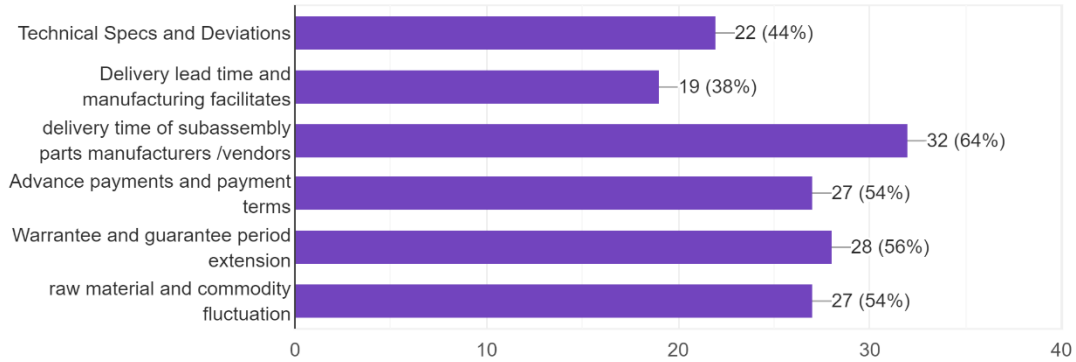
Which on the following management practice used in your organization to mänge risk?

50 responses



Which of the following will concerns in your Risk Management review ?

50 responses



SURVEY QUESTIONS & RESPONSES - SUBCONTRACTOR FIRMS

What is your level of Position in your organization?

50 responses

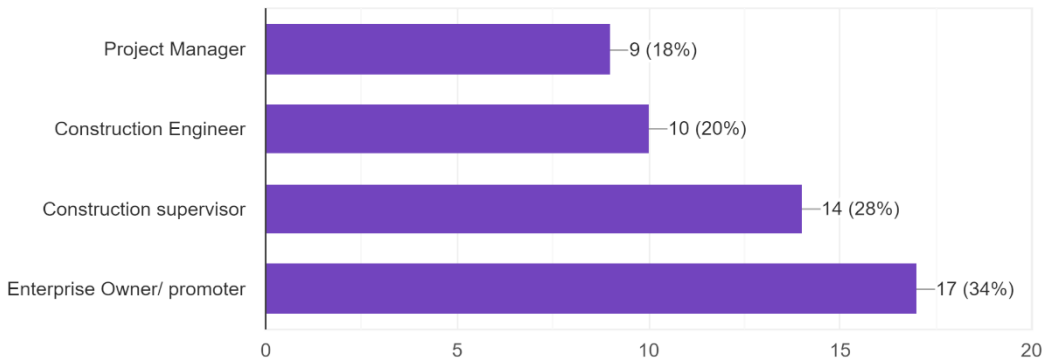
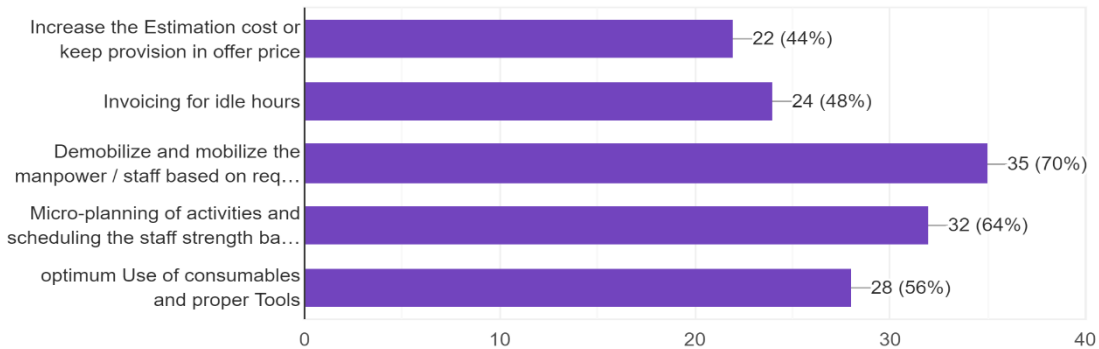


Figure 7

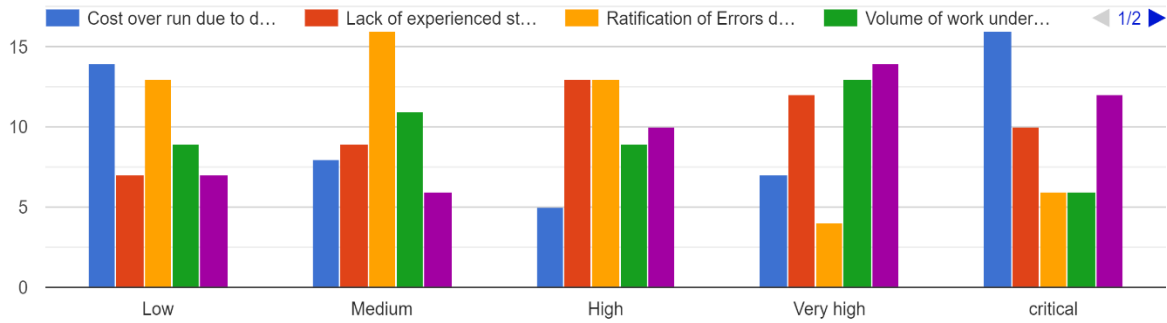
SURVEY QUESTIONS & RESPONSES - SUBCONTRACTOR FIRMS

Which of the below option your organization use to manage the risk?

50 responses



Which of the below risk your organization most concern or treat as high level of risk?



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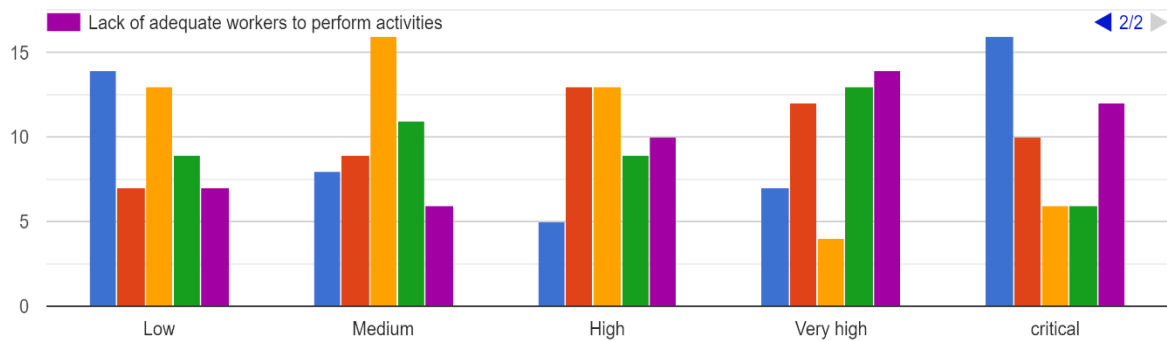
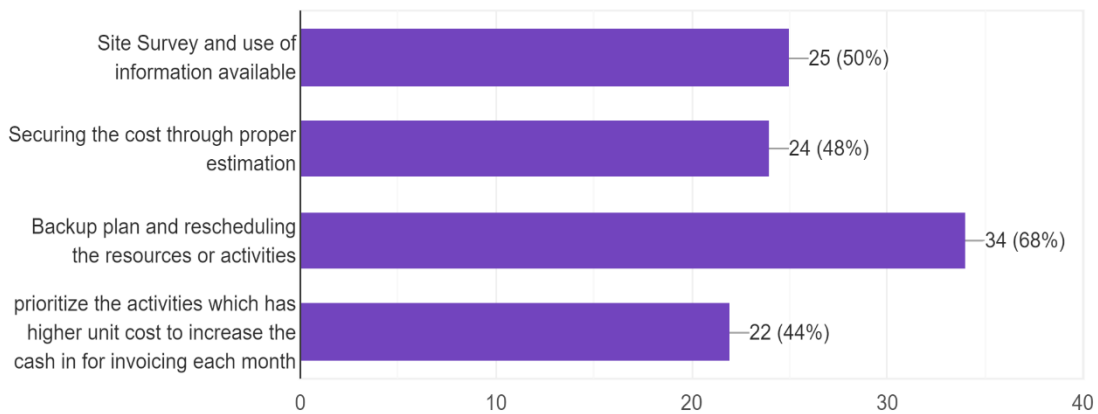


Figure 8

SURVEY QUESTIONS & RESPONSES - SUBCONTRACTOR FIRMS

Which on the following management practice used in your organization to manage risk?

50 responses





CONCLUSION:

This Pilot study shows that significance of risk differs from Project owners, EPC Firms Product manufacturers and subcontractors. Three elements were found in Project Owners and EPC firms mainly risk identification, risk transfer to other firms and risk mitigation or treatment as a part of risk management practices. And it is identified that the risk management practice differs amid category of companies involved in project sector. Product manufacturer and subcontractor has high potential in terms of defects liability and volume of risk whereas EPC firms has liability towards their commitment through contract clauses while Project owner has transfer risk through contractual obligations to EPC Contracts.

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