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RANKING OF RISK IN RAILWAY PROJECTS

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ABSTRACT

Railway systems have become the spine of country transport infrastructure, with lowest level of environmental pollution and highest level of power efficiency. Railways not only facilitates travelling in the country by reducing travel time but also develops the business along its corridors. It has very high carrying capacity to cater to huge passenger demand thus drastically reducing land acquisition for the same load. It requires much less space to carry same number of passengers. In this study the various aspects of railway projects were investigated. Data reliability was established and according to Relative importance index analysis results. Questionnaire surveys were used to collect data. This project is based on the construction phase's risks. For the data analysis RII technique is used.

KEYWORDS: Relative Importance Index, Railway Projects, Risk Management

I. INTRODUCTION

Railways are treated as an economic, efficient, environmentally friendly and very safe mode of transport. Also India's biggest department is Railway Department i.e. Indian Railway, which is having special and separate financial budget in Indian polity i.e. Railway Budget. So it is obvious that the occurrence of risks in Railway projects are more. So it is necessary to do risk management in Railway Projects.

Risk management is a concept which is used in all industries from IT related business, automobile or pharmaceutical industry to the construction sector. Every firm has developed their own risk management standards, but the general ideas of the concept usually remain the same regardless of the sector. According to the Project Management Institute, project risk management is one of the nine most critical parts of project hiring. This shows a solid connection between managing risks and a success of project. While risk management is described as the record hard area within construction management [1] its application is promoted in all projects in order to avoid negative consequences [1]. One concept which is broadly used within the arena of risk management is called the risk management process and consists of four main steps: identification, assessment, taking action and monitoring the risks [2]. In every stages, there are a number of schemes and methods which enable conduct the risks. Many enterprises have become more active and aware of using inspects in projects. Likewise, RM has become a timely issue widely discussed across industries. But, with respect to the construction companies, risk management is not usually used. More construction firms are starting to become conscious of the Risk Management Process, but are still not using models and systems aimed for managing risks. This indicates the fact that the industry is trying to be more cost and time efficient as well as have more controller over projects. Risk is associated to any project nevertheless the industry and thus Risk Management should be of interest to any project manager. Risks differentiates the projects due to the fact that every project is exclusive, especially in the construction trade. Yet there are still many experts that have not realized the importance of including RM in the process of bringing the project. Even though there is a consciousness of risks and their significances, some organizations do not approach them with established Risk Management methods. The construction industry operates in a very uncertain environment where conditions can change due to the difficulty of each project. The purpose of each institute is to be effective and Risk Management can facilitate it. However it should be take into consideration that risk management is not a tool which ensures success but rather a tool which helps to increase the probability of achieving success. Risk management is therefore a proactive rather than a reactive concept. Many preceding studies [3] have been conducted within the field of Risk Management but each offerings a different approach to this idea. The research in this master thesis emphases on the railway projects and how the subject is practiced in the daily operation. The concept of Risk Management is presented in a systematized project

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life cycle attitude to show differences between fundamentals of Risk Management Process in different phases of project. The investigation for this study was led together with a consultancy company working with railway project, which works for railway projects. This party consults with risks in a way that they are conscious of risks, but do not use any specific structured means to grip them. However, they believe that a project's act can be improved by applying RM policies.

II. RESULTS AND DISCUSSION

For data collection the question nary survey was done, and the questioner was distributed in many of Railway consultancies and the government employees of Indian Railways. Total 150 questioner was distributed out of which 80 replies came.

Sample Size Calculation

The formula given below is used for the calculation of sample size.

$$SS = [Z^2 \times P \times (1\text{-}P)] / C^2$$

Where,
SS = Sample Size.
Z = Z Value (e.g. 1.96 for 95% confidence interval).
P = Percentage picking a choice, expressed as decimal, (0.50 used for sample size needed).
C = Confidence interval (0.1)
POP is the Population = 146

The Ministry of Railways has transferred 146 projects to Rail Vikas Nigam Ltd (RVNL) for execution, so that is why the population size is taken as 146.

$$SS = [1.96^2 \times 0.5 \times (1\text{-}\ 0.5)] /0\ .1^2$$
$$= 96.04$$

Correction for finite population:

$$SS\ new = \frac{SS}{1+\frac{SS-1}{POP}}$$

$$= 58.172$$

Here, in this case total 80 replies are there, which is proven to be good for present study.

Relative Importance Index Method

Data for all these study were analyzed by a RII Index was calculated for each type of claims as follows:

$$RII\ Index = \sum W / (A * N)$$

Where, W = weighting given to each factor by respondents which ranges from 1 to 5,
A = Highest weight (i.e. 5 in this case) and
N = total number of respondents.

	Risk Factor	∑W	RII	Individual rank	Average of RII	Overall Rank
1	**FINANCIAL RISK**					
1.1	Delayed payments on contract	299	0.747	1	0.699	5
1.2	Unmanaged cash flow	261	0.652	2		
1.3	Inflation	213	0.532	4		
1.4	Financial failure of the contractor	220	0.550	3		
1.5	Construction cost overruns	204	0.510	6		
1.6	Labor and Material Costs (Contract, Outsourced)	205	0.512	5		
1.7	Interest Rate Changes (Credit and Interest Rate Risks)	163	0.407	7		
2	**DESIGN RISK**					
2.1	Defective design (incorrect)	295	0.922	1	0.772	3
2.2	Design Changes	256	0.800	2		
2.3	Awarding the design to inexperience Designer	190	0.594	3		

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3	**POLITICAL RISK**					
3.1	New governmental acts or legislations	139	0.434	1	0.434	14
4	**LEGAL RISK**					
4.1	Ambiguity of work legislations	156	0.488	3	0.595	11
4.2	Difficulty to get permits	204	0.638	2		
4.3	Disputes among the parties of contract	211	0.659	1		
5	**MANAGEMENT RISK**					
5.1	Poor communication between involved Parties	243	0.759	3	0.691	7
5.2	Improper planning	214	0.669	4		
5.3	Changes in management ways	150	0.469	5		
5.4	Resource management	251	0.784	1		
5.5	Management of Contracts & Joint Ventures	247	0.772	2		
6	**MATERIAL RISK**					
6.1	Material not conforming to the specification	255	0.797	1	0.775	2
6.2	Availability of material	241	0.753	2		
7	**SITE SAFETY**					
7.1	Occurrence of accidents because of poor safety procedures	257	0.803	2	0.694	6
7.2	Labor safety	271	0.847	1		
7.3	Security of material and equipment	198	0.619	3		
7.4	Varied labor and equipment productivity	162	0.506	4		
8	**SITE RISK**					
8.1	Improper site investigation	237	0.741	3	0.796	1
8.2	Land use and acquisition/ resettlement and rehabilitation risk	286	0.894	1		
8.3	Poor communications between the site and head offices (contractor side)	241	0.753	2		
9	**ENVIRONMENTAL**					
9.1	Adverse weather conditions	187	0.584	2	0.529	13
9.2	Difficulty to access the site (very far)	171	0.534	3		
9.3	Environmental factors (floods, earthquakes, etc.)	201	0.628	1		
9.4	Environmental norms	145	0.453	4		
9.5	Weather Volatility (Seasonality, Catastrophes (Cat) Risk	142	0.444	5		
10	**CULTURAL**					

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10.1	Religion	122	0.381	1	0.375	15
10.2	Cultural custom	118	0.369	2		
11	**CONSTRUCTION**					
11.1	Gaps between the Implementation and the specifications due to misunderstanding of drawings and specifications	230	0.719	1	0.639	10
11.2	Actual quantities differ from the contract Quantities	219	0.684	3		
11.3	Lower work quality in presence of time Constraints	219	0.684	4		
11.4	Undocumented change orders	170	0.531	10		
11.5	Expired temporary construction permits	160	0.500	11		
11.6	Contradictions in the construction document	218	0.681	5		
11.7	High competition in bids	211	0.659	6		
11.8	Quality Control and Time Management	205	0.641	7		
11.9	Supplier provisioning risk	200	0.625	8		
11.10	Operations failure Risk	188	0.588	9		
11.11	Construction Defects	229	0.716	2		
12	**EXTERNAL RISKS**					
12.1	New stakeholders emerge and request changes	158	0.494	4	0.534	12
12.2	Public objections	191	0.597	2		
12.3	Laws and local standards change	133	0.416	6		
12.4	Tax change	184	0.575	3		
12.5	Major dependence on one client	219	0.684	1		
12.6	Reputation Risk	141	0.441	5		
13	ORGANIZATIONAL RISKS					
13.1	Inexperienced workforce and staff turnover	184	0.575	3	0.688	8
13.2	Delayed deliveries	255	0.797	1		
13.3	Lack of protection on a construction site	221	0.691	2		
14	**CONTRACTUAL RISK & EXPOSURES**					
14.1	Contractual Liability (Breach, Third Party Action)	231	0.722	3	0.712	4
14.2	Liquidated, Consequential and Punitive Damages Clauses	196	0.613	4		
14.3	Force Majeure Clauses (Schedule Delay)	232	0.725	2		
14.4	Subcontractor Default, Abandonment	252	0.788	1		
15	**HUMAN RESOURCE RISK**					
15.1	Inadequate succession planning	218	0.681	1	0.660	9
15.2	Inability to attract quality personnel	200	0.625	3		

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15.3	Manpower Risks- Specialized manpower leaving the jobs	216	0.675	2		

III. CONCLUSION

Present study finds that which risk is having first Rank among all Risk factors. According to above analysis of collected data it is conclude that **Site risks, Material risk** are most important in Railway projects.

According to preventive method analysis it is concluded that generally risk is transferred to other party or they refer previous and ongoing similar projects.
Whenever project objectives are suffer they

- closely coordinate with their subcontractors,
- Increase manpower and
- Increase working hours.

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