International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2016): 79.57 | Impact Factor (2017): 7.296

Risk Factors Affecting in Highway Construction Project

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Abstract: ***Highway construction projects carry some substantial risks. The main aim of this paper is to identify the most significant risk factors affecting highway construction project in Manjeri (Malappuram-Kerala) SH71 & to decrease the probability and impact of those risks. The research method begins with extensive literature review to provide a prime risk factors list which was also to reach final risk factor list which contains all risks that may be faced during highway construction. Subsequently, a set of 10 risk groups consisting of 34 risks was selected and a questionnaire survey was conducted to determine the likelihood and consequences of the identified risks. A questionnaire is then developed to the opinion of construction professionals (Engineers, Contractors, Stake holders, Overseers and Supervisers) as to the probability and impact of those risks. Twenty surveys were completed and used in the risk analysis. The priority of each risk is calculated by multiplying the probability with the impact for each risk. The priority helps identify the most significant risks. The relative importance index (RII) for the risk priority is calculated based on all responses for each risk. The most significant risks include Existing traffic, unexpected ground utilities, delays in payment, inadequate claim administration, quality and integrity of design, delays in approvals, and delays in expropriations. Existing traffic is the most important risk in Manjeri highway construction***

Keywords: Risk analysis, Relative important index

1. Introduction

Risk management is a key issue in project management. The first step of risk management is risk identification. It includes the recognition of potential risk event conditions in the project and the clarification of risk responsibilities. Project risk management includes the processes concerned with identifying, analyzing, and responding to road project risk. It includes maximizing the results of positive events and minimizing the consequences of adverse events. Managing risks in construction projects has been recognized as a very important management process in order to achieve the project objectives in terms of time, cost, quality, safety and environmental sustainability. However, until now most research has focused on some aspects of construction risk management rather than using a systematic and holistic approach to identify risks and analyze the probability of occurrence and impact of these risks. Indian highway construction projects are associated with different levels of risks. The main objective of this paper is to identify and assess the significant risks in the Manjeri (Malappuram-Kerala) SH71. Risks are identified through literature review. The identified risks are then assessed in terms of the probability and impact .Relative important index is used to calculate the risk priority.

2. Objective of the Study

The objective of the risk management in highways are the following: To identify the various risk factors in high way projects, To understand the concept of risk management, Investigate how the sector manages risks, Facilitate the use of RM focused on the highway construction.

3. Benefits with Risk Management

The benefit of risk management are the following: Reduces surprises (Improve control of adverse events, take action), Exploitation of opportunities (Seek opportunity),Improved planning, performance, effectiveness and utilization of resources, Positive effect on reputation (Attracts-investors, students, staff), Accountability, assurance and governance (Maintain integrity and confidence) etc.

4. Limits of Risk Management

Limits of risk management are the following: The level of risk is always related to the project complexity, The bigger the project is, the larger the number of potential risks that may be faced.

5. Methodology

The methodology adopted in this paper is given below: Study of literature related to various risk factors affecting highway construction project ,Site study (Manjeri location-SH71), Preparation of questionnaire, Site visit and data collected from PWD Section, Questionnaire survey and personal interviews with Site-Engineers, Supervisor ,Project Engineer and Overseers ,Risk identification using questionnaire survey, Analyzing the questionnaires, Risk classification (from 34 risk factors),Ranking of top 10 risk factors by using Lickert scale(Relative Important Index).

6. Questionnaire design and structure

Questionnaire was developed to participate of project engineer, contractor, supervisor, site engineer and stake holders to rank the risk management factors. The

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questionnaire has been assembled around of main 34 factors which affect the risk management in highway construction . It include,

- Personal details of PWD and interviewer.
- Factors influencing risk management.

Questionnaire consists of following sections:
Section 1-General information.
Section 2-Assessment of risk factors.

The first part consisted of three questions for each identified risk. Two questions were related to the probability and impact of each risk on five-point Likert scale. The scale ranged from 1(very low) to 5 (very high). The third questions relates to the proper allocation of the risk based on the respondent's experiences. The second part consists of categories of risk. Risk factor for this project classified into mainly 6 categories, namely: Technical Factors, Site factors, Commercial Factors, Political Factors, Environmental factors, Socio-Economic Factors.

6.1 Relative Important Index (RII)

It is used to determine the relative importance of the various causes and effects of delays. The same method is going to adopted in this study within various groups (i.e. project engineers, site engineers, and site supervisor). The five point scale ranged from 1 (No impact) to 5 (Very high impact) will be adopted and will be transformed to relative importance indices (RII) for each factor as follows:

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

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.

The RII value had a range from 0 to 1, higher the value of RII, more important factor in risk management. The RII was used to rank (R) the different causes. These rankings made it possible to cross compare the relative importance of the factors as perceived by the three groups of respondents (i.e. Project Engineer, Site Engineer and Supervisor). Each individual cause's RII perceived by all respondents should be used to assess the general and overall rankings in order to give an important factor .

7. Factors Affecting the Risk management in highway construction

34 risk factors affect the Manjeri highway construction, Technical factors, Site factors, Commercial factors, Political factors, Environmental factors, Socio-Economic factors. From 34 risk factors, top 10 risk factors should be selected and ranking according to the priority.

8. RII Calculation

Top 10 factors ranked by Relative Importance Index (RII) technique. To identify the most significant factor affect the risk management in highway construction. The most important factor was ranked based on RII values.

Table 1: Top 10 significant Risks in the Manjeri Highway construction

No	Social and cultural impact	Priority	Rank
1	Existing traffic	0.72	1
2	Inadequate claim administration	0.70	2
3	Inefficient Planning	0.68	3
4	Unexpected underground utilities	0.64	4
5	Quality and integrity of design	0.63	5
6	Delays in the approvals of submittals	0.58	6
7	Delays in payments	0.52	7
8	Inadequate safety measures	0.46	8
9	Poor coordination	0.40	9
10	Material , labour and equipment	0.38	10

9. Result and Conclusion

A questionnaire- survey was conducted to find the response of project engineer, site engineer, contractor, supervisor towards risk factors affecting the highway construction project in Manjeri location. 34 factors are to be considered and distributed to the respondents. The most important risk factor is Existing traffic ,its RII value is 0.72.

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