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Risk Modeling in Highway Construction Projects

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Abstract:- Highway construction projects carry some substantial risks. The main aim of this project is to identify the most important risk factors affecting highway construction project in Manjeri (Malappuram-Kerala)SH71 & to decrease the probability of those risks. The research method starts 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. 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 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. . The statistical analysis for the data is done using Statistical package for social science. To create a suitable Regression Model.

Keywords:- *Risk analysis,Relative important index, Regression model.*

I. INTRODUCTION

Risk management is a important factor in project management. The first step of risk management is risk identification stage. 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. 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 .Relative important index is used to calculate the risk priority. Then to create a suitable Regession model by using SPSS.

II. OBJECTIVES OF 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, To Investigate how the sector manages risks, Facilitate the use of RM focused on the highway construction, To create a suitable regression model.

III. METHODOLOGY

The methodology adopted in this project 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 datas 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).Then statistical analysis for the data is done using SPSS package. Then to create a suitable regression model.

A. 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.

B. Relative Important Index(RII)

This 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.

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C. RII Calculation

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

NO	RISK	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

. Table 1.Top ten significant risks in Manjeri highway construction.

D. Regression model

From the statistical analysis(SPSS) result, a regression model can be obtained. It can be in the form of coefficient table. Regression is a statistical analysis to determine the linear relationship between two or more variables. Regression is used for prediction and causal inference. It includes many techniques for modelling and analysing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables. It helps one understand how the typical value of the dependent variable changes when any one of the independent variables id varied, while the other independent variables are held fixed.

MODEL COEFFICIENTS

UNSTANDARDIZED		COEFICIENTS B	Std.error	S.COEFICIENTS BETA	T	SIG.
1	(Constant)	-.144	.313		-.423	.640
	INEFFICIENT PLANNING	1.212	.261	.946	3.836	.231
	QUALITY AND INTEGRITY OF DESIGN	-.241	.465	-.152	-.542	.544
	DELAYS IN PAYMENT	-.841	.407	-.842	-2.021	.055
	INADEQUATE CLAIM ADMINISTRATION	-.025	.111	-.022	-.215	.736
	UNEXPECTED UNDERGROUND UTILITIES	.750	.348	.747	2.128	.232
	INADEQUATE SAFETY MEASURES	.238	.462	.181	.525	.612
	DELAYS IN THE APPROVALS OF SUBMITTALS.	-3.127E-12	.627	.210	.110	1.10

Table 2. Regression Model

A. Dependent Variable: Existing traffic

IV. RESULT AND CONCLUSION

A questionnaire- survey was done 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.To create a suitable regression model related with risk factors.

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