A STUDY ON ROLE OF DECISION-MAKING DURING HIGHWAY CONSTRUCTION PROJECTS

Vinod Kumar Sharma
Research Scholar
Department of Civil Engineering
Shri JJT University,
Jhunjhunu, Rajasthan
svinod.kairu@gmail.com

Dr. Sivakumar Ramamoorthy
Assistant Professor
Department of Civil Engineering
Shri JJT University
Jhunjhunu, Rajasthan
siva.civilguy89@gmail.com

Abstract: *In each industry, decision-making is very important to success, mainly in highway construction, which needs the supervision of a large amount of data and expertise. Decision making plays an important role to control and minimizing the accidents in highway construction. When proper decision making tools will be used in a systematic manner then the frequency of road accidents also can be diminished. By applying the suitable techniques for decision making, the different issues related to it, can be resolved. During the whole life cycle of a highway project, from starting to the end, obstacles and issues will arise. The object of this study is to cover the different decision taken during the highway construction. This study is also including the different decision making tools, which can be used during highway construction. In this study the researcher collect the information from different sources as books, articles, expert discussion, literature review and internet etc. This article provides a general study on decision making of construction in highway projects. This study is helpful to know about the different tools of decision making during highway construction. This study also important to know the limitations of tools used in it.*

Keywords: *Decision-Making, Highway, Construction Projects.*

Introduction

To put it another way, decision-making is an artistic endeavor in which facts, data, experience, faith, intuition, and prejudice are blended a choose from a number of possibilities In decision analysis in building operations, academics such as Ayyub and Haldar combine choice considerations, alternatives, consequences, risk estimates, and decision criteria on the other hand. Clemen and Reilly (2004) describe decision-making as a mix of values and objectives, alternatives, unknown occurrences, and repercussions, which they refer to as the four essential characteristics of decision-making. The two classes are distinct, despite the fact that they are reducible to one another. When presented with a choice issue's criteria, the word objective may refer to both the precise direct and indirect objectives that decision makers try to attain, as well as the norms, attitudes, and standards that guide their judgments The decision maker must then predict the ramifications of different decisions based on the information presented using particular methodologies Many judgments are made with some ambiguity about the information, variables, system behavior, and other actors actions As a result, a decision-making problem may be recast as the challenge of examining and evaluating the outcomes of a number of possibilities before settling on one that provides a good trade-off between the problem's criteria. Decision makers, decision instruments, and selection techniques, as well as their linkages, are portrayed as the three main components of the decision-making process This graphic does not claim to

represent ontology or a complete decision-making model; rather, it tries to sketch out some of the key aspects and components that have proven to be useful in the development of decision-making literature.

Research Objectives

1. To study about the decision making in highway construction projects.
2. To study the role of decision making in the speedy construction of highway projects.

Review of Literature

Anita Ihs et.al (2003)

Road traffic accidents result in many deaths or severe injuries each year, which is a major public health issue. As new traffic safety measures are being developed, it is critical that the information be disseminated and implemented. An extensive literature review encompassing a wide range of topics was ordered by the Swedish National Road Administration (SNRA) in order to gather data on current research in the field of traffic safety. This study focuses on the evolution of the road transportation system. Certain restrictions have been put in place since this is a very large topic. Traffic ability, accessibility, environmental effect, and safety are examined, as well as metrics and methodologies used to describe how road surface quality affects these notions.

Noppadol and Arun Kumar (2004)

This research includes a review of the literature on the risk assessment of inaccuracies in road maintenance and rehabilitation budget estimates. Uncertainties and variability in input factors increase the risk of budget estimation mistakes. The randomization of occurrences such as meteorological conditions, soil conditions, and road user traffic causes uncertainties and variability in input parameters. In analyzing the danger of mistakes in budget projections for road maintenance and rehabilitation, this paper shows how existing procedures include uncertainty and variability of road asset conditions, as well as other essential input characteristics.

Daniel Jato-Espino et.al (2014)

Making the proper decisions in the construction industry might be the difference between success and failure. Furthermore, most activities in this sector need taking into account a large number of competing aspects, making overall management challenging. Multi-criteria decision making analysis was created to describe difficult scenarios like this.The adoption of 22 different approaches from this discipline in 11 different categories in the construction industry is examined in this article. The most significant methods are briefly discussed, with their major advantages and disadvantages underlined. Furthermore, the data gathered throughout the creation of the article is statistically analyzed to find distinct trends in the application of these tactics.

Mazdak Nik Bakht et.al (2015)

Decision making has long been a focus of research in the field of construction engineering and management. The environment in which decision-makers work has altered as a result of recent events (for example, the drive for sustainability, the greater demand for public participation, and the globalization of construction). As a consequence, models for how people make decisions should change to reflect this transition. Decision makers, decision instruments,

and processes for selecting the best option are the three basic components of decision-making topics investigated. There has been a significant trend away from pure deterministic models and toward (fundamentally) probabilistic models including stochastic approaches. Because engineering concerns are so complicated, a shift from judgmental to rational selection techniques has happened. The observed changing patterns are stated to be pushing for more network focus, managing the evolutionary (and sometimes chaotic) process, and using user collective intelligence to create new solutions.

Abbas Mardani et.al (2015)

MCDM (multiple criteria decision-making) is a complex decision-making approach that combines quantitative and qualitative factors. In recent years, many MCDM methodologies and approaches for picking the best available options have been developed. The purpose of this article is to take a systematic look at the applications and methodology of MCDM methods and approaches. Experts published more articles in 2013 than in prior years, according to the results of this study. Furthermore, in the integrated methods, the analytic hierarchy process (AHP) methodology and hybrid MCDM were listed as the top and second techniques in use, respectively, in the individual tools.

Methodology

The construction sector is divided into categories based on the kind of project, such as building projects, transportation projects, and so forth. Each project type has its own set of characteristics that determine the project's cost and length. A range of project characteristics that are particular to the kind of project affect the time and expense of a project. Even though similar activities occur in different kinds of projects, the cost and length are likely to vary greatly owing to the fundamental features of the activity in each type. Despite the fact that site clearing is a common feature of both highway and building construction projects, the cost of site clearing in a highway project will obviously differ from the cost of site clearing in a building project because the activity is linear in a highway project but discrete in a construction project. Highway development projects, particularly National Highways and Expressways, were investigated in this study, with samples collected from different construction sites throughout India. These locations have a broad variety of features, including topographical, geological, political, and social aspects, all of which are likely to impact project length and cost. The data obtained was quantitative as well as qualitative.

Quantitative Data

The length and cost of certain activities, as well as the duration and cost of the total project, were included in quantitative data. Data on current and finished projects was acquired from a mix of commercial companies, government agencies, and project management consulting businesses that employed fully automated technologies in compliance with Indian government regulations. Different project planners used different terms for the activities. As a consequence, it's become necessary to categorize the tasks using a standardized vocabulary. Following this experiment, the major highway building operations were identified.

Qualitative Data

The study's qualitative data includes information on the reasons of highway building project length and cost overruns. The project's time and cost overruns are due to a variety of unforeseeable factors that could not have been predicted during the early planning stages. Discussions with project management professionals and relevant literature revealed the most prevalent reasons of activity delays in highway building projects (P K Joy 1998). One hundred and ten of India's best highway construction consultants, project engineers, resident engineers, and retired officials from public sector construction enterprises received a copy of the report. Based on the findings of this study, some key reasons of highway building project delays.

Data Analysis

The gathered data from numerous highway building projects was evaluated to identify the data's stochastic character. All data on activity duration, cost, duration overrun, and cost overrun was found to vary greatly with time, project nature, site location, and site characteristics such as soil type, water table, material availability, and so on. Because of the vast range of data, it was necessary to define a probability distribution function for each activity parameter, such as time, cost, and overruns. The quantitative and qualitative data were each analyzed individually.

Activity Duration Analysis

The probability model for highway project activity durations is based on the actual length of the activities on the job site. Eleven primary activities linked with highway building have already been selected for comprehensive examination based on the data obtained. The duration of these operations in a project varies depending on the length of the roadway to be built during a certain time period. This was predicated on the idea that site characteristics that impact the duration of an activity in one stretch would also affect the activity across the course of the project. The T test, developed by Beest on (1983), is used to determine the magnitude of the data obtained. The test statistic is provided by equation.

$$n = \left(\frac{1.23T\sigma}{0.3M}\right)^2$$

Where

M is the median of the sample

n is the sample size

T is the Student's t value for 90% confidence limit and corresponding degree of freedom and

o is the standard deviation of the sample.

The sample size necessary with a 90% level of confidence has been calculated. The magnitude of the data acquired for each action at this confidence level is significantly more than the needed sample size at 90 percent confidence level, according to the study. Table 1 shows the minimum sample size necessary as well as the sizes of the data obtained for each activity.

Table: 1 Sample size required and available for activity duration

Activity	Sample size required (90% confidence level)	Available sample size
Clearing	8	94
Sub grade	4	94
Capping layer	4	74
Sub base	12	80
Road base	12	94
Base Course	12	94

Wearing Course	40	94
CD, Foundation	4	74
CD. Substructure	4	74
CD. Super structure	3	74
Drainage	4	90

Conclusion

In the quantitative study numbers of simulation runs were employed. By adjusting the number of simulation runs, the overall project time and cost were computed. The Erlang probability distribution function was found to be followed by the stochastic analysis over the full project period. This conclusion may be presumed to be typical of all highway building projects in India since all of the data utilized in the research came from highway construction project locations in India. It shows the total project length with varied numbers of simulations runs for both extremum and realistic analyses, and shows the final findings distribution curve for total project duration. Because the study was unable to give the varied scenario, this shows that the distribution functions for the extremum assessment are not converging to a single one. Due to the implementation of limitations based on the maximum and minimum activity time in the site, the model was able to simulate the complete range of project duration and cost in the realistic analysis.

The critical route was observed to change based on the lengths of the activities when the activity network was evaluated. The modifications in critical route, project time, and related likelihood are shown; it displays the results of the first thirty simulation runs once the distribution function has been stabilized; while other shows the probability distribution function over the project duration throughout all simulation runs. It goes without saying that activity durations will vary based on the circumstances on the job site. As the period of the activity project and the related likelihood alter, so will the critical route.

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