

# IDENTIFICATION OF FACTORS AFFECTING DELAY IN HIGHWAY PROJECT AND IT'S IMPROVEMENT

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**Abstract** - Construction delays are common problems in civil engineering project in India. These problems occur commonly during project life-time leading to disputes and legal action. Therefore, it is necessary to study and analyzed causes of construction delays. The opinion of construction experts was obtained through questionnaire survey. Then questionnaire survey was prepared. A questionnaire survey is conducted to consider the time performance of construction projects in India to identify the causes of most delay factors calculated. A total 69 causes of delay were identified during the research. The delay factors were grouped into eight major groups. Because every project is unique in its perspective every project has its individual causes for the delay. Based on this response the relative importance and ranking of these delay factors were analyzed by RII. According to these result the most delay factors are discussed and some suggestions were made to minimize and control delays in highway construction project.

**Key Words:** Delay, Highway project, construction, Relative Important Index (RII).

## 1. INTRODUCTION

Construction industry is the sources of income to several developing countries, so these postponements and their effects on the construction projects is a main concerning issue among the many industry experts and intellectual. Investment in infrastructure in a country of India's size is comparatively low (7.5% of GDP) and is much negligible if we compare with some other countries in Asia India has a street system of more than 4,870,000 kilometers in 2017, the next biggest street organize on the planet.

Good infrastructure is the key to certifying development. Gujarat, the main industrialized state in the nation. Gujarat has always been the innovator in innovation in reign. The government of Gujarat to launch a number of schemes advance the infrastructure in the state. With the general advancement of the state as a main priority. The all out length of road in Gujarat remains at 104664 kms with state highway representing 18647 km. The percentage of roads as State Highways in Gujarat is markedly higher than Maharashtra, Andhra Pradesh and Karnataka. The road density in the state positions at 147 km for each lakh of populace developed than the all India normal of 127 kms for every lakh of populace. Stage and cost overwhelms have

been a principle issue disturbing the foundation projects in India bringing about postponing of large amount of highway schemes. The study has been completed on the various continuous road construction project under NationalaHighwayaDevelopment Project. While the cost occupies are found to be up to 20% above original cost calculation that also withina10% of the schemes, time invades are play a major difficulty to project operation. This is evident from the upsetting records of ofa60-80 % of the schemes entwined in time invades reaching froma3 to 79 month.

## 2. OBJECTIVE

The objective of this study was to explore the following aspects:

- To successfully diminish the delay to overcome time overrun, cost overrun and poor quality work.
- To study the reasons behind the occurrence these kind of delay and find out the ways to reduce and ultimately eliminate them.
- To show the importance of identifying and reducing the delay in the current construction industry and its effects.
- To improve quality.

## 3. SCOPE OF WORK

To make the study more precise, general and realistic, surveys and analysis is limited within the definite boundary. The scope of study is limited to Gujarat state. Highway projects are considered and made a part of this research work.

## 4. RESEARCH METHODOLOGY

Following methodology was implemented to complete the research work.

1. Primary data was gathered by conducting a questionnaire survey and expert interview amongst many specialists like construction manager, consultant, professors, and contractors.

2. Review of literature was done by referring local and global research papers, reference books, construction journals etc.
3. Data analysis was done on the basis of the collected data. Relative Important Index (RII) method.
4. Declaring the results and conclusion from the analyzed data.

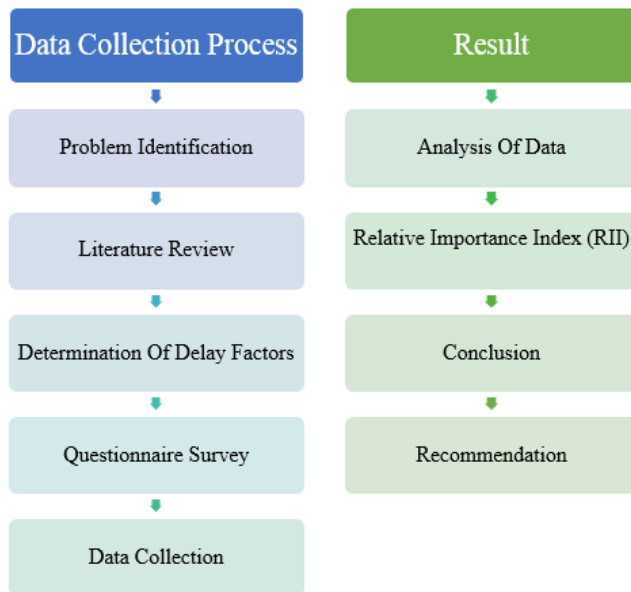


Fig -1: Research Methodology

### 5. MEASUREMENT OF DATA IN QUESTIONNAIRE SURVEY

The Delay disturbing the construction work (and responsible for time and cost overrun & poor quality work) will be answered by giving number from 1-5. The numbers in questionnaires signify the scale as:

NUMERICAL SCALE	WEIGHT OF EACH SCALE
1	VERY LOW
2	LOW
3	MODERATE
4	HIGH
5	VERY HIGH

Fig -2: Measurement of Data

There are a total of 69 limiting factors which I found during literature study and by interviewing various experts from the construction industry. These limiting factors falls under the 8 main types of constraints which are shown in the below figure.

SR.NO.	FACTORS
<b>Causes related to Contractor</b>	
1	Difficulties in project financing by contractor
2	Current financial situation of contractor
3	Ineffective construction method implemented by contractor
4	Limited site area
5	Payment problems between contractor and employees
6	Improper planning and scheduling of project by contractor
7	Rework due to errors during execution
8	Poor communication between contractor and other project parties
9	Inexperienced contractor's manpower
10	Shortage of manpower
11	Poor site management and supervision by contractor
12	Staffing problem
13	Shortage of equipment
14	Delay in resources mobilization
15	Equipment availability
16	Delay in material delivery by vendors
17	Labour dispute and strike
<b>Causes related to Owner</b>	
18	Interference by the owner during execution operation
19	Delay in decision making by the owner
20	Delay in progress payments by owner
21	Budget availability for the project
22	Delay in reviewing and approving contract documents by the owner
23	Poor communication between owner and other project parties
24	Change in project scope
<b>Causes related to Consultant</b>	
25	Delay in solving design problems
26	Major changes in design during construction phase
27	Missing dimensions in the drawings
28	Difference between specifications and drawings prepared by consultant
29	Delay in approving major changes in the scope of work by consultant
30	Delay in reviewing and approving design documents by consultant
31	Delay in issuing the drawings
<b>Causes related to Services and Utilities</b>	
32	Utilities are unidentified or incorrectly located

33	Delays in the relocation of utilities
34	Utilities may not see work as a priority
35	Slow response by utilities
36	utility information are not clearly defined in drawings
<b>Causes related to External Environment</b>	
37	Traffic diversion
38	weather effect on execution activities
39	Scarcity of materials in the market
40	Accidents at construction site
41	Effect of social and cultural conditions of inhabitants
42	Political situation and security
<b>Causes related to government regulation</b>	
43	Difficulties in obtaining work permits
44	Tendering system requirements of selecting of lower bidder
45	Delay in finalization of rate for extra item
46	Physical possession of the land
47	Change in laws and regulation
48	Land acquisition
49	Delay in obtaining permissions and approvals from local authorities
50	Summer restriction of time of work
51	Change in drawing
52	Design development
53	Change order
54	Inadequate planning
55	Inadequate scheduling
56	Contract modification
<b>Causes related to construction</b>	
57	Material procurement
58	Poor subcontractor performance
59	Defective work
60	Difference in site condition
61	Labor injury
62	Construction mistake during operation
<b>General factors</b>	
63	Type of project
64	Method of construction
65	Inflation in material price
66	Location of project
67	Project complexity
68	Weather conditions
69	Degree of trouble of work

Fig -3: Types of Delay

## 6. DATA ANALYSIS

Here we collected 40 responses as data collection & that collected data has to be analyzed to find out the most important factors affecting Delay in Highway projects. Relative Important Index (RII) will be utilized to rate the different parameters. These assessments make it possible to analyse the relative importance of the parameters as observed by the arrangements of respondents.

Formula of Relative Importance Index Method.

$$RII = \frac{\sum W}{A * N}$$

Where

W= Weightage given to each factor by the respondent (ranging from 1 to 5),

A=Highest weight (ranging from 1 to 5),

N= the total number of respondents.

### 6.1 OUTPUT OF ANALYSIS

After collecting the data, we analysed all the data in relative importance index method. We got the final output after two phases.

Relative index of each other's Ranking

#### 6.1.1 RELATIVE INDEX OF EACH OTHER

The below result shows the relative index for each factor which shows an importance of each factor as compare to others. The relative index is calculated by summation of total ratings of each factor, which is divided by a multiplication of highest Likert scale and number of respondents.

#### 6.1.2 RANKING

After finding the relative importance index, they are arranged in a hierarchical order (i.e. from top to bottom). In this way, by discovering the overall positioning of each factor we can think about the most important and least important factor out of the considerable number of components.

RELATIVE INDEX OF TOP FACTOR

Sr.No.	Factors	ΣW	RII=ΣW /5*40	RANK
48	Land acquisition	195	0.975	1
1	Difficulties in project financing by contractor	194	0.97	2

43	Difficulties in obtaining work permits	192	0.96	3
14	Delay in resources mobilization	191	0.955	4
31	Delay in issuing the drawings	190	0.95	5
4	Limited site area	188	0.94	6
42	Political situation and security	187	0.935	7
33	Delays in the relocation of utilities	185	0.925	8
64	Method of construction	183	0.915	9
37	Traffic diversion	182	0.91	10

Fig -8: Relative Index of Top Factor

RII DIAGRAM

The below figure shows the diagram of RII on the basis of which we can find out the factors which are most important for delay.



Chart -1: RII Diagram

7. CONCLUSION

Project delay are the most common factors in construction industry in India. Causes of delay and its effect on time, cost, and quality in construction projects are always likely obstacles to be project success. This dissertation work study number of major as well as minor delay factors will be identified in highway projects. And based upon this factor concluded some suggestion and give them to contractor, consultant, engineers & owners to reduce the delay of projects. Based on a total 69 factors, a survey was designed to collect the view of experts with experience in highway projects. Data from the survey was analyzed using the Relative Importance Index (RII) and factors of delay were ranked. Based on the ranking top ten delay factors are land acquisition, difficulties in project financing by contractor, difficulties in obtaining work permits, delay in resources mobilization, delay in issuing the drawing, limited site area, political situation, delay in the relocation of utilities, method of construction, traffic diversion .In this research based on identified delay factors prepared recommendation to reduce effect of delay in state highway projects.

8. RECOMMENDATIONS

Based on the result of the study, the following recommendation are minimizing the problem associated with delay:

The client or government should ideally have 70 % to 80% of a land necessary for a scheme before inviting bids from interested bidders. But sometime after inviting bids. Delay in handover the site to contractor for work. For reduce this problem complete full land acquisition process. Then after invite bids. Some contractor facing the problem of "credit crunch" but Cash requirement for procurement of material and others expenses could lead the contractor into a very critical situation which may obstruct the progress of work and may cause delay in completion of project. For reducing this problem, the contractor must be self-sufficient with the funds before the start of the project to avoid any delay. For reducing delay in resources mobilization problem select the vendor how is punctual regarding the delivery of the resources. And also, location of the resources in ideal position must be near execution of work. . For the reducing o limited site area problem detail study in terrain of the area and selection of resource as per terrain. Ineffective construction method implemented by contractor its May contractor fail to complete project with in given time. This failure is interrelated with lack of effective methods of construction and insufficient contractor experience towards the project. For reducing this problem contractor should adaption of latest technology and methods. To arrange the short term and long-term training program for project manager and engineers of company. Traffic diversion is one of the most critical problem in road construction industry. For reducing diversion problem do proper analysis of the traffic density and provide a suitable root. Providing and



design of curve such that any type of vehicle passes easily and minimum problem to road users.

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