

An Analysis of Time and Cost Management in Highway Projects- Case Study of National Highways

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Abstract : Effective cost and time management play an important role to achieve the project success within the industry. Various cost and time management techniques which help to manage cost and time overrun within the development project. It is commonly accepted that construction cost, time and quality performance has been considered the key success factors for a construction project. With the increasing use of innovative contracts in highway construction, the connection between construction cost and time has become more crucial than ever. This study explores the functional relationship between highway construction cost and time. This study is to research the factors which will cause overrun of the planned cost, allocated resources and scheduled time of infrastructure engineering projects

Keywords —Scheduling, Contracting, Highway Construction, Construction Time, Construction Cost formatting,Activities.

I. INTRODUCTION

Time and cost estimation for infrastructure projects, especially those involving construction, can be difficult due to a variety of factors. As a result, estimating the final project time, cost, and contingencies, especially at the pre-feasibility stage of a highway project in developing countries, is a difficult task. In this report, a search was conducted to evaluate and analyse various construction-related projects in order to improve the level of estimation at the pre-feasibility stage cost and time performance of highway projects in India.

The aim of the study presented here is to look at the time and cost actions of highway projects and come up with conclusions about these issues that can help manage them in significant ways to meet the goals set forth. As a result, it's important to note that a project's degree of success is determined by the Triangulum of scope, time, and cost. As a result, it's important to investigate the causes of project delays and cost overruns. In this regard, the most common, expensive, complicated, and risky problem encountered in construction projects is usually acknowledged as delay. This study is conducted as a systematic examination of time and price behaviour over a period of time.

II. OBJECTIVES

Even with the vast integrated knowledge areas in project management, delay and price overrun are the foremost common issues in construction projects. Thus, it's significant to notice that the degree of success of a project is defined within Triangulum of scope, time and cost. As such, it's important to seem at the causes of those delays and price overrun in projects. In this regard, this

research study has been taken to following objectives. To find the effect of time and cost monitoring on progress of highway construction projects.

- To recognize the most important factors that affect construction time and cost
- To identify the factors causes delay from consultants and contractors perspective
- To identify and share various actions, contribute to minimize cost of highway.
- To find the reasons for prevalent time and cost overruns in highway project .

III. LITERATURE REVIEW

The studies and practices adopted by many researchers for effective time and value management are reviewed, a literature survey of varied projects published within the construction planning has been discussed. Literature from all the stages are considered for review.

1. Makam Kishore Kumar, Chappidi hanumantha Rao, , "Time and cost overrun analysis of highway projects "(2015)

This research is for National Highway Development Project (NHDP) to upgrade, rehabilitate and widen 45000 km of Indian highways commenced in 1998 is a great learning experience leaving a vast scope for improvements on the implementation of ongoing works. Besides haring the achievements of this grandiose plan, this thesis has attempted to bring out the various impediments faced at different stages of its execution which in turn would help the planners to rightly size up of the continued highway program. Statistical Analysis using correlation and regression technique was

carried out on 224 Nos highway projects spread in the various parts of India. The analysis has brought out that delays were mostly in initial phases of NHDP viz., GQ and NSEW corridor work

Poor response from Concessionaires to take up projects on BOT (Toll and Annuity) basis and in that eventuality inadequacy of funds to get the work on EPC mode The states of the Indian federation should share the responsibility of fiscal consolidation and prudence during a federal polity. State finances need to be strengthened, for both macroeconomic and structural reasons

2. YASAS L. PATHIRANAGE, RANGIKA U. HALWATURA “Factors Influencing the Duration of construction Projects in Sri Lanka”, (2019)

This study attempts to reveal the factors influencing the duration of construction projects in Sri Lanka, and to spot how delays are often mitigated. The emphasis here is limited to study the Contractor's point of view. The main concern of the study is to spot the character of the population (Road projects in Sri Lanka) using Statistical Inference. The other focusing areas are to identify Main Causes of Delay & Delay Diversification, and Delay Mitigation. This study defines the Percentage Delay parameter and the Relative Significance Index (RSI) model, which are the new concepts introduced by the author this study. Road Construction. The collected data yields a high reliability coefficient, which is 90%. This study reveals that the local road construction projects experience 56% - 88% of average time overrun compared to the original (planned) project duration. The findings further illustrate that the financial problems of the Owner also as of the Contractor, is that the most influencing factor causing delays in construction projects in Sri Lanka

3. SHANMUGANATHAN N, DR. G. BASKAR, “Effective cost and time management techniques In construction industry”.(2016):

The most important factors were discovered through a questionnaire survey of professionals from different construction industries. This survey was conducted using a questionnaire that was distributed to various construction professionals. Engineers, contractors, and customers are among these experts. Furthermore, all of the practitioners are chosen based on their experience, and particular attention should be paid to their educational qualifications.

4. JIN-FANG AND WEI-TONG CHEN, “Functional model of cost and time for highway construction projects.”.(2016):

This analysis gathers projects undertaken by the FDOT in order to develop a model that shows the functional relationship between construction cost and time for the projects gathered. This proposed model will give SHAs and contractors more control and understanding of the progress of highway construction projects, as well as allow contractors to more flexibly regulate construction time and expense,

making it easier for them to win a bid. The model presented in this study can be used to:

- (1) Determining the most days of incentive in an I/ D project, and an affordable range of your time duration in an A + B contract for SHAs; and
- (2) Developing an improved strategy for determining the terms for the I/D and A + B + I/D projects

5. JAWAD A. ALSULIMAN, “Causes of delay in Saudi public construction projects”, College of Engineering, Ucontractors interested in such projects. niversity of Business & Technology (UBT), (2019):

This paper contributed the study results and showed that the highest influential factors of projects completion are: that specialize in financial analysis and awarding all-time low bidder, awarding contractors projects beyond their financial and technical potential, selecting contractors who produce other, faltering projects, ministries aren't inquisitive about the event of the engineering sector, government entities are late in giving financial rights to contractors, the weakness of economic and technical capabilities of some contractors, and government entities don't withdraw the delayed projects from the faltering contractor. so as to place the questionnaires' results into perspective, it absolutely was decided that a public sector construction project would be analyzed by a method that was suggested.

6. SHREYASH RAUT, S S PIMPLIKAR, KARAN SAWANT, “Effect of project cost and time monitoring on progress of construction project”.(2013):

As project grows in size and complexity, the power to plan, monitor and control the project has become a key project management function. like all other business, builders, contractors and developers should plan and organize their day to

day activities so as to manage effectively. The task of project monitoring and control is to grant a good indication of the existence and therefore the extent of problems related to a project. therefore project should have an effect cycle as follows with the aim of completing project within acceptable time and budge. Monitoring and control cycle consists- • Make an idea • Implement the plan • Monitor the particular output and record it. • Report the particular, the planned parameters and their variations.

7. HANBIN LUOB HUAZHONG, “Analysis of Delay Impact on Construction Project supported RII and Correlation Coefficient: Empirical Study Tsegay Gebrehiweta”,(2013)

The results of the analysis show as time overrun and value overrun were the 2 most typical effects of delays in Ethiopian construction projects. Although this research conducted to spot the foremost causes and effects of delays within the Ethiopia construction projects supported the development

process, but the research can apply in another country with the **IDENTICAL** situation and further study.

IV. STUDY AREA OF THE PROJECT

According to NHAI's Project Implementation Units (PIUs), adverse law and order conditions, difficulties in land acquisition in Maharashtra, Karnataka, and Tamil Nadu; removal of a large number of structures, including places of worship such as temples, mosques, and majars (tombs), are the key factors contributing to time and cost overruns in the NHDP packages. Removal of various utilities such as water mains, electrical lines, sewer lines, telephone lines, and wind mills in Bihar, Karnataka, Maharashtra, West Bengal, and Tamil Nadu; and felling of trees in states such as Jammu and Kashmir, Madhya Pradesh, and others; and removal of various utilities such as water mains, electrical lines, sewer lines, telephone lines, and wind mills in states such as Bihar, Karnataka, Maharashtra, West Bengal, and Tamil Nadu. Due to factors such as local soil and geology of the area; insufficient deployment of trained personnel by contractors at project-sites; difficult geology of the region as in the case of packages undertaken in the Deccan region of Maharashtra, changes in nature, delay in obtaining approval for rail over/under bridges (ROB/RUBs), and changes in alignment following contract award. It is reasonable to assume that the source of the delay and cost overrun has eaten deep into the industry and have given the construction industry a bad image for decades.

V. METHODOLOGY

The methodology of research work includes following,

1. Identification of problem

This phase is recognizing and classifying the problems and making the objectives of the study and improvement of research plan

2. Review of literature

In this second phase relevant research data from national and international journals, web source, text books, and reference books are to be collected for review and study the research problem and compute gap of research work.

3. Data Collection

In this phase of research all the relevant conceptual data collection that can help to achieve the objective set forth to this study.

4. Data Analysis

The collected data from the above phase is to be analyzed with to investigate factors influencing the research.

5. Case studies/ Site Visits

In this phase selecting the construction sites as case study. Detailed study and analysis is to be done by visiting the site and discussion on the subject of the causes of time and cost overruns.

6. Results, Discussion and Conclusions

This stage of the research centred on factor analysis of the results and discussions after evaluating the data. Based on the estimate and actual time and cost obtained from the feasibility report and completion report in the studied projects, a satisfaction factor was established. Conclusions and guidelines are included in the research's final process..

VI. ANALYSIS OF TIME AND COST OVERRUNS

Despite the government's recent efforts to boost the economy through various incentives, the country's new road construction projects have been slowed due to the overall economic downturn, funding problems, land acquisition delays, and delays in new project awarding. Furthermore, the ambitious Bharatmala scheme, which aims to construct 32,600 kilometres of national highways by the end of 2022, is expected to overrun by 55 percent and be completed only in 2024-25.

The NHAI has developed new deadlines in the event of land acquisition delays. According to them, 75% of the projects awarded are on track to be completed on time. Though consistent projects demonstrate the model's sturdiness, future awards will rely heavily on bank credit. Developers and lenders are wary about accepting scheduled dates before they have encumbered-free property, which is good for the sector's health.

The discrepancy between the actual project length and the originally planned duration, expressed as a percentage of the initially projected duration, is known as time overrun. Real out-turn costs minus projected costs as a percentage of estimated costs is how cost overrun is calculated. True accounted construction costs calculated at the time of project completion are referred to as actual costs. Although cost overruns are found to be up to 18 percent higher than original cost estimates in just 10% of projects, time overruns are a significant roadblock to project completion. This is shown by the shocking statistic that 70% of projects are encumbered by time overruns ranging from 3 to 78 months, as seen at following table

Table1

(Source : Project Implementation Status Report (Jan-Mar 2008) Ministry of Statistics and Programme Implementation, Govt of India)

Category of Project	Nos	Original Cost (₹ billion)	Revised Cost (₹ billion)	Overrun
Total Projects	224	621.22	630.72	1.53 %
With cost overrun	21	64.49	76.10	18 %
With time overrun	148	361.79	371.06	3 - 78 months
With time and cost overrun	20	61.84	72.22	3 - 65 months

Apart from quantitative details such as the name of the road stretch being improved to four or six lanes, the National Highway Route No, the length in kilometres, the Date of

Approval, cost and time overruns, and so on, the status reports also included detailed information provided by PIUs such as the reasons for delays. PIUs cited land acquisition, utility relocation, poor contractor results, contract termination, contract late completion, rains/floods, law and order issues, and delays in bridge ROB/RUB approvals as major causes of delay. The data was inserted under the respective columns where the project was delayed due to those reasons for delay when tabulating.

In total, 72 projects have been delayed due to land acquisition, with 21 of them coming from the state of Assam. It is clear that a project may be postponed for one or more purposes as recorded by the project's implementing authorities. Furthermore, no data was entered in a large number of projects, as many as 101, because Project Implementing Units (PIUs) did not state any explanations for the delays. Furthermore, the data shows that only 17 of the 46 highway projects approved in 2000 were completed, with the remaining 29 still in service after a decade. The development of the NSEW corridor is similar to that of the GQ corridor, but the situation has changed after Phase III. It's worth noting that the NHDP's initial phases were very successful.

The project, which was accepted in the year 2000, had massive time overruns, which were reduced in the later phases, particularly from Phase III onwards, as seen in the positive trend of reduced time overruns in the later phases. This could be due to the teething problems that were encountered initially.

Table 2

NHDP Phase	No of Highway Packages	Mean Delay (months) [Status Report 2008]	Mean Delay (months) [Status Report 2010]	No of Projects affected by							
				Land Acquisition	Utility Shifting	Contractor Poor Performance	Termination of Contract	Late Conclusion of Contract	Rains/Floods	Law and Order	ROB Approvals
Golden Quadrilateral	25	37	43	10	8	16	9	3		1	3
East West Corridor	79	15	23	37	20	19	2	12	28	20	2
Phase III	26	-12	12					8			
MORT&H	11	4	15	4	1	2			1	1	
North South Corridor	66	12	21	17	13	14	3	4			4
Other Roads	7	10	20	1	2						
Port Connectivity	8	10	21	3		3	3				
Phase V (6 Laning)	2	0	0								
Total	224	14	32	72	44	54	17	27	29	22	9

NHDP Phase wise delays

(Source-State wise progress of various highway packages under NHDP)

Periodic reviews by the monitoring agency NHA are needed to resolve the complexity of cost overruns in EW corridor projects for successful implementation. The status of various projects, ranging from phase I clinical trials to phase

VII, where it is often observed that each project is lagging far behind its initial completion schedules.

Delay Index Model for Estimation of your time Overruns

The model proposed during this research study is specifically tailored to highway projects and includes the inputs provided by Project Implementation Units (PIUs). Furthermore, the equations produced are state-specific and simple to understand and apply. Land acquisition, utility shifting, weak contractor efficiency, termination of contract, late conclusion of contract, rains/floods, law and order problems, and delays in approvals of bridges ROB/RUBs are among the delay factors enunciated by Project Implementation Units (PIUs). It should be noted that the nit of Delay Index is merely a number, while time overrun is measured in months.

Illustration of Delay Index Model :

- Name of Project : Kadapa-Mydukur-Kurnool
- Length : 188.752 kms
- National Highway : NH 18
- Project Cost : ` 1585 crore
- NHDP Phase : III
- Letter of Acceptance (LOA) : Feb 2009
- Date of Commencement : Nov 2010
- Scheduled Completion by : May 2013
- Present Progress : 70% (as on Jul 2013)
- Expected Completion by : Mar 2014 (as intimated by PIU)
- Contractor : KMC and IVRCL Consortium
- Independent Engineer (IE) : Aarevee Associates Architects
- Mode of Execution : BOT (Toll)

Since the project is found in Andhra Pradesh and therefore the reason for slow progress being poor performance of contractor, the weightage for delay fatcor as per [1] is 0.019. For this lone delay factor, Delay Index = 0.019.,as per [1],

$$\text{Time Overrun (on 2008 data)} = 0.846 + 454.772 \times 0.019 = \mathbf{9.48 \text{ months}}$$

$$\text{Time Overrun (as per 2010 data)} = 8.750 + 585.383 \times 0.019 = \mathbf{19.87 \text{ months}}$$

Time Overrun as ascertained from PIU = **10 months** (Mar 2014 – May 2013)

Furthermore, the severity of the delay factors cannot be determined in the absence of such data from PIUs. This shortcoming is often overcome when PIUs are asked to share their awareness of delay factors as well as their severity on a linear rating scale. In the vast majority of instances, time overruns are supported by DI and Project Cost are almost identical, with little difference. Furthermore, these overruns may not be sacred and are merely an estimation that alerts officials to focus on projects with time overruns.

To a project developer who relied on revenue from the

project starting on a particular date to meet the repayment timetable for the project finance, a delay is not only an embarrassment but also a major risk of the entire enterprise's financial failure. On the contractor's hand, a delay in execution means higher overheads than planned. According to the MOSPI (2016), at the end of September 2014, 312 of 750 infrastructure projects were behind schedule. These projects' time overruns vary from 1-247 months. The value overrun in the delayed projects has resulted in a rise of 18.75 percent in the original cost.

Table 3

Cost overrun in roads & highway project in India at the end of year 2014						
Sector	No. of Projects	Cost Original	Cost Latest	Cost Anticipate d	Cost Overrun w.r.t Original	Cost Overrun w.r.t Latest
Road Transportati on & Highways	1364	102,321.44	102,692.45	104,388.44	2,067.00	1,695.99

(Source : (MoSIP, 2016))

Through a literature review, several reasons for cost and schedule overruns in construction projects were discovered. A literature review described risks that result in cost and time overruns in PPP-based highway projects. Through a study of the literature, there are a total of 29 risk factors that result in time and cost overruns in PPP-based road and highway projects.

Table 4

Identified 29 Risk Factors and their Category		
SN	Risk Factors which Results in Time and Cost Overrun	Category
1	Mismanagement by the contractor	Technical
2	Cash flow during construction	Financial
3	Political interference	Political
4	Government policies	Legal
5	Change in the scope of project/extra work	Technical
6	Lack of equipment/labour efficiency	Technical
7	Political situation of the country/state	Political
8	Additional works	Technical
9	Force majeure (Act of God)	Environmental
10	Political Force majeure	Political
11	Inflation	Economical
12	Underestimation	Technical / Financial
13	Fluctuation in exchange rate	Economical
14	Delay in land acquisition	Legal
15	Design errors & omissions	Technical
16	Effect of weather	Environmental
17	Non payment of completed work	Financial
18	Delay in confirmation from client on cost, quality, time, etc	Technical
19	Technology transfer disputes	Technical/Political
20	Inadequacy in documentation	Technical/Legal
21	Increase in taxes/charges	Economical
22	Shortage of material/labour	Technical/Economical

23	Public interference and protest from environmental activists	Social
24	Conflicting national and state laws	Legal/ Political
25	Incomplete design scope	Technical
26	Conflict in drawings and specifications	Technical
27	Permit/Approval related delays	Legal/Environmental
28	Decision making process	Technical
29	Change in site conditions	Environmental

Sampling Size

Sampling is described as the process of selecting a neighbourhood to represent an entire area. In most cases, performing a census is impractical because it can be very expensive and time consuming.

The Sampling Technique

The respondents were chosen using purposeful and practical sampling techniques during this analysis. The respondents were purposefully selected as a result of the scientist's requirement for precise information and expertise in order to determine the respondents' degree of involvement. Significantly, the method of enlisting members to participate in the study is critical to ensuring that each unit in the sample population has an equal chance of being chosen. The central concept is that the sample size should include choices that represent the entire population, and that such conclusions would be applied to the entire population.

The sample size for the study was determined by using following formula:-

$$n = \frac{(z_{\alpha/2})^2 pq}{E^2}$$

Where n = number of items in sample $(z_{\alpha/2})^2$ = square of the confidence level in standard error units, p = estimated proportion of successes q = 1 – p, or estimated proportion of failures E^2 = square of the maximum allowance for error between the true proportion and the sample proportion

Hence at $z_{\alpha/2} = 1.645$ (Z score 90% confidence interval is 1.645), $E = 10\%$ and $p = 0.5$

$$n = \frac{1.645^2(.5)(.5)}{0.1^2} = 67.65$$

□ A sample size of 68 professionals is the were obtained by using the above formula. However, due to the time constrain a sample size of 53 professionals were used in this paper.

Data Analysis for questionnaire survey

Data analysis can be defined “as consisting of three concurrent flows of activity: data reduction, data display and conclusion drawing/verification” Data analysis of this thesis was based on the three steps defined by reduction, data display and conclusion. After completing the data collection, the data was analysed using both descriptive data and adopting the relative importance index to find the ranking

factor among all the factors articulated from the literature review. Relative importance index formula: -

$$RII = \frac{W}{A \times N}$$

Where

W = the weight given to each factor by the respondents and ranges from 1 to 5 A = the highest response integer = 5

N= the total number of respondents

Questionnaire was prepared for the primary data collection. A questionnaire is a pre formulated written set of questions to which respondents record their answers, usually within rather closely defined alternatives. The questionnaire was designed specifically to solicit responses from professionals involved in PPP based roads and highway projects. Questions in a questionnaire could be open-ended, close-ended or a mixture of the two, based on the expected outcome. Due to the research paradigm adopted the main questions in the questionnaire were designed to be close ended. The questionnaire used in this research was consisting of two parts that is part A and part B. Both part combine contains 6 questions. 'Question 1' sought to investigate characteristics of the professionals; their institution of work; position held amongst other issues. 'Question 2' investigate the professional's organization type (Contractor, Client, and Consultant). 'Question 3' investigate the personal experience of the professional about completion of highway projects within budget time and cost. 'Question4' investigates which project phase of PPP based highway project is most risky and the professional were asked to rank the phases on the bases on their experience. 'Question 5' and 'Question 6' investigates impact of the factors responsible for time and cost overrun in PPP based roads and highway projects and the professional were asked to rank based on the likert scale of 5 how significant the factors are.

Only 65 of the 800 questionnaires distributed via the online survey site were returned, and only 53 were considered to be valid for data analysis. The study yielded a response rate of 6.625 percent using these valid questionnaires. This means that the response rate was very poor. Respondents, on the other hand, were a seasoned group of contractors, consultants, and customers with a wide range of experience.

Table 5

Organization demographics		
Organization Type	Number of responses	Percentage
Clients	12	22.64
Contractors	7	13.21
Consultants	34	64.15
Total Respondents	53	100

Table 5 indicates that consultants made up 63.46 percent of the respondents. As a result, the study's results show the perspectives of those who are not employed in either the public or private sectors.

Findings and Analysis of Question 3

As previously mentioned, question 3 looks at the professional's personal experience with completing highway projects on schedule and on budget. "From respondent's past experience, what percentage of roads and highway projects are completed within budget time and cost?" was the open-ended question. Just 30.58 percent of PPP-based highway projects are completed on schedule and within budget, according to this question.. From this question, it's been discovered that only 30.58% PPP based highway projects are completed within budget time and cost.

Findings and Analysis of Question 4

As previously stated, question 4 investigates which project phase of a PPP-based highway project poses the greatest danger. On the basis of their experience, respondents were asked to rank the project phases, namely growth, design, service, and project life cycle, as 1=most risky, 2=very risky, 3=somewhat risky, and 4=least risky.

Table 6

Analysis of project phases of PPP based highway project w.r.t risk involved in them					
Phase of roads and highway projects	1=most risky, 2=very risky, 3=somewhat risky and 4=least risky.				Percentage of respondent's rank
	1	2	3	4	
Development Phase	36.54	28.85	13.46	21.15	
Construction Phase	46.15	32.69	11.54	9.62	
Operation Phase	5.77	26.92	51.92	15.38	
Project Life Cycle	11.54	11.54	23.08	53.85	

From the interpretation of the survey data, it's been found that construction phase of the PPP based highway project is the most risky phase as 46.15% of respondent ranked it 1(1=most risky) while project life cycle phase is least risky as 53.85% of respondent ranked it4. (4=most risky)

Findings and Analysis of Question 5

Question 5 looks into the impact of various factors (types of risks), such as financial factors, legal factors, environmental factors, technical factors, social factors, and political factors, on PPP- based highway projects in terms of time and cost overrun, and the respondent was asked to rate each factor on a 'Likert rating scale of 1 to 5'. The 5-point scale was chosen to avoid respondents giving neutral responses. The factors are graded according to their RII, which is determined using earlier.

Table 7

Impact of type of risk on PPP			
SN	Factors	RII	Rank
1	Financial Factors	0.80	1
2	Environmental Factors	0.72	2
3	Political Factors	0.71	3
4	Legal Factors	0.68	4
5	Social Factors	0.63	5
6	Technical Factors	0.62	6

The findings of the studies are summarised in Table 7. The highest ranking factor with a RII of 0.80 is shown in the table of all 'Financial Factors.' This may be because the financial feasibility of a PPP-based project determines its performance. Furthermore, it corresponds to the findings of study performed by researchers in various countries. According to table 7, respondents rated "Environmental Factors" as the second most important factor, with a RII of 0.72, and "Political Factors" as the third most important factor, with a RII of 0.71. Respondents ranked 'Legal Factors' fourth with a RII of 0.68 and 'Social Factors' fifth with a RII of 0.63, respectively, while 'Technical Factors' is the least impactful fact..

Findings and Analysis of Question 6

Question 6 looks into the impact of various factors (risks) on PPP-based highway projects in terms of time and cost overrun, with 1 = "Negligible Impact" and 2 = "Low Impact." In comparison to the analysis of question 5, the analysis of question 6 is even more in-depth, as total 47 variables from all six forms of risk categories were considered. The factors are ranked according to their RII, which is determined according to the formula mentioned earlier.

VII. CAUSES OF DELAYS AND SUGGESTED MEASURES

This segment takes the research's analytical component a step further by identifying the different causes of delays and diagnosing the time and cost overruns.

Pre-Construction Activities

Much of the progress on the road will be determined by how quickly obstacles such as land acquisition delays, State Forest and Pollution Control Board (PCB) clearances, structure demolition, and utility relocation are removed so that the stage is set for construction

.Land Acquisition (LA)

Land acquisition, more than any other factor, is the most significant stumbling block to growth, especially in the infrastructure sector. In an agrarian economy like India, land is not only a valuable commodity, but it also has emotional and sentimental value. No one enjoys being evicted from their homes, particularly when forced evictions are necessary for development projects such as dam and reservoir

construction, highway construction, and industry development.

The National Highways Act of 1956 establishes the designation of such highways as national highways, as well as other provisions. The National Highway Act of 1956 was used to acquire land for the expansion of various roads. Under the NHDP, the National Highway Act of 1956 was used to acquire land for the expansion of various highways. NH Act 1956, on the other hand, has a number of flaws, including revenue authorities who are unfamiliar with the Act and land records that are out of date, resulting in inherent delays in the LA process, delays in the award of compensation by competent authorities, insufficient institutional framework at the state level, difficulty in transferring LA plans on the ground, inter-departmental coordination, and an emergency clause for acquisition. Delays can occur as a result of delays in the transfer of utilities and clearances from the forest and environmental ministry.

Detailed Project Reports (DPRs)

Because of lack of expertise with the consultants and lack of seriousness on their part leads to change scopes etc Hence because of faulty preparations of DPR causes delay in the projects

Financing Mechanism of NHDP

Historically, the government has made infrastructure investments, especially in highways, due to the large amount of resources needed, long gestation period, uncertain return, and associated externalises.

Private investment in infrastructure sectors around the world is growing as a result of the delivery of reliable services to consumers at reasonable rates. A project based on a contract or concession arrangement between a government or statutory body on the one hand and a private sector corporation on the other for the delivery of infrastructure services in exchange for user fees is referred to as a Public Private Partnership (PPP) project.

Rains/Floods

Unlike manufacturing in covered factories, construction projects are exposed to natural calamities such as rains, snow, scorching temperatures, torrential winds, and dust storms. A sizable number of projects were stated to be behind schedule, amounting to a respectable double digit percentage of all projects. Strong rains fall on our country's North-Eastern (NE) states for around 6 months a year, beginning in March, while the rest of the country waits for monsoons in June. As seen in J&K, Arunachal Pradesh, and Himachal Pradesh, snowfall and cold weather have a devastating effect on all construction projects due to the effects on cement environment. Rainstorms and floods are natural calamities that cannot be avoided.

Policy Decisions

The Golden Quadrilateral, which began in 1998 with the goal of connecting four major metropolitan cities, was originally scheduled to be completed in December 2003, but it was finally completed in May 2013 after a ten-year wait. As of May 31, 2013, 86 percent of the 7000 km NSEW Corridor was four-laned, compared to a deadline of December 2009 for completion.

Delays in the government of India's ambitious highway initiative, as well as various policy decisions, are to blame for the current state of affairs.

- Shifted Priorities from Highways to Rural Development
- Huge Increase in Scope Of Works
- Slow pace on Increased Involvement of Private Sector
- Laxity on implementing National Road Transport Policy

VIII. CONCLUSIONS AND RECOMMENDATIONS

Concluding the research at the end tried to summarize the findings of the analysis of time and cost managements.

1. Proper planning and scheduling are very important to ensure that the project should be completed within a given period duration. To minimize the construction cost and duration at each phase is necessary. It is a need to meet the present-day requirements and to complete the project within the estimated time, cost, and available resources.

2. Mainly affecting the factor on cost of project is delay in project and material. Proper planning, selection, procurement, installation, operation, maintenance and equipment replacement policy plays important. Effective time and cost monitoring in the highway project will lead to timely completion of the project.

3. Most of the common causes that affect the construction time and cost are Pre-construction activities such as land acquisition, utility shifting etc not geared up so as to keep pace with the proposed completion schedules. Delays in preparation of Detailed Project Reports (DPRs) incorporating feasibility studies, traffic projections and revenues etc. Delays in Project Approvals, requisite clearances from concerned Ministries as Railways for ROB/RUBs, MOEF for forest clearance etc.

4. It is noticeable from the study that some of the causes of delays in construction projects have very high frequency such as delays in payments from client, deficiencies in planning & scheduling, delays approvals of drawing by consultants, defective preparations of DPRs, change orders etc. These critical and high influence problems need to be investigated in detail with research focusing on the root causes for these problems and mitigation for these problems.

5. Based on the findings in the research, it is recommended that the mitigation of cost overruns in road projects be undertaken from the early stages. Use of various cost optimizes techniques helps lot for the effective cost control of the projects. It is worth noting that the aspects related to design require profound changes, which could imply modification of design development methodologies and even the implementation of new technologies that allow solving the current deficiencies that are causing the cost overrun occurrence.

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