Causes and Effects of Cost and Time Overrun of Road Construction Projects in Gujarat

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Abstract: A number of road construction projects are increasing from time to time in Gujarat, India. However, completion in predetermined cost and time is difficult. The aim of this research is to identify the factors causing cost and time overrun on road construction project in Gujarat and to give relevant recommendations for the most critical factors. This study delimited in causes and effects of cost and time overrun of road construction projects in Gujarat. Questionnaire survey was employed to collect the data from the contactors, clients and consultants and Relative Importance Index (RII) method adopted for analysis. Form the analysis four and eleven major factors identified for cost and time overrun causes one-to-one. Spearman's rank coefficient has adopted to test the agreement to in ranking of the factors. There is a strong correlation in ranking between the Consultant Vs Client (Gov't body) for the factors affecting cost overruns and Contractor Vs Client (Gov't body) for factors affecting time overruns. Findings of the study will help designers, clients, and contractors to aware and improve of cost and time overrun in road constructions in the future.

Key words: Cost Overrun, Time Overrun, Causes, Effects, Gujarat

I. Introduction

1.1 Background of Construction Industry

Construction industry is truly the power of national economy as a whole through which the total of physical development is achieved. It has a significant effect on other industry sectors efficiency and productivity. Without construction facilities, it is difficult to think investments like fishery, manufacturing, agriculture, etc.

Construction industry is full of projects, project activities and constraints that are completed with significant cost and time overruns. Delays negatively affect project success in terms of cost, time, quality and safety as well. The impacts of construction delays are not only limited to the construction industry, but also the overall country's economy. There are several factors that are responsible for cost and time overruns in the construction industry. Attention should be paid to the factors as they cause additional cost and time in the project than initially estimated. Macroeconomic factors that affect the cost of the construction project are most severely [10].

1.2 Construction Sector in India

In India, construction industry is poorly organized consisting of unorganized players that work on subcontract basis. Due to the nature of the industry, it requires intensive capital, intense labor, and is risky, companies are trying to mechanize from few years onwards. As a result of mechanization, requirement of labors in FY 2004 decrease by 0.7% after four years. The industry plays vital role in economy, industrialization, urbanization of the country. It consists of 40%-50% of the country's capital expenditure to various projects like highways, roads, railways, airports, energy, irrigation, etc. and it is the second largest industry next to agriculture 11% of total GDP [19].

In construction industry cost overruns are usual. In India, hardly few projects are completed on their original estimated costs. According to reports of the Statistics Minister on 31stMarch, 2012, out of 555 ongoing projects 179 of them had cost overruns by Rs.1.23 lakh crore. Their major causes were cost underestimation, change in foreign exchange rates and statutory duties, escalation in cost of land, high cost of environmental safeguards and rehabilitation measures, inflation and delay in projects. According to the reports, details of the cost overrun projects of railways was the first by Rs 69,551.81 crores, second by Rs 15,886.71 crores petroleum and third Rs 15,113.80 crores power sectors. The cost of projects escalated by Rs 6,187.54 crores, Rs 5,272.90 crores, 4,838 crores in steel, urban developments and atomic energy sectors respectively [17].

1.3 Gujarat Road Construction Sector

Gujarat state is located in western part of India. The state has good transportation infrastructure with wide road network. The Road and Building Department of the state is responsible for construction and maintenance of roads including Panchayat roads in the state. The department has six branches in Twenty-six districts [20].

Table 1: Type of road and its length in Gujarat [20]

Sr. No.	Type of Road	Length (in km)	%
1	National highways	4032	7
2	State highways	19761	36
3	Panchayat roads	30019	54

4	Sugarcane roads	1746	3

1.4 Problem Statement

Construction projects have difficulties like construction methods and administration as well as limitation of resources, budget, quality and time. The critical problems are failure to complete the projects on time and with the estimated budget. Like other types of constructions, road construction projects are experiencing cost and time overruns i.e. they required additional budgets and time than what had signed during signing of the contract. This problem, in turn, is causing difficulties in financing of upcoming projects, timely utilization of the facility by the public and the relationship among stakeholders involved in the construction process. Because of this problem, this studyis conducted.

1.5 Objectives of the study

This research work has the following main objectives:

- ✓ To study the existing system of cost and time overrun.
- ✓ To identify the various factors which causes cost and time overrun of road construction projects in Gujarat.
- ✓ To give recommendations for the most critical factors.

II. Literature Review

2.1 Definitions of Cost Overrun and time overruns

Cost Overruns:

Cost is the budgeted expenditure, which the client has agreed to commit for creating/acquiring the desired construction facility [21]. Cost overrun is the amount by which actual costs exceed the baseline or approved costs. It is defined as the positive difference between the final or actual cost of a construction project at completion and the contract amount agreed by the client and the contractor during signing of the contract [23]. Actual costs are defined as the accounted costs actually spent, as determined at the time of project completion [21].

Time Overruns(Delay):

Stumpf defined delay as "Act or event that extends the time required to perform a task under a contract. It usually shows up as additional days of work or as delayed start of an activity." [12].

In construction, the word “delay’’ refers to something happening at a later time than planned, expected, specified in a contract or beyond the date that the parties agreed upon for the delivery of a project [22]. The difference in actual cost that incurred for construction and initially estimated cost known as cost overrun and it is a prime factor that affects successful completion of projects [8].

2.2 Causes of Cost Overruns

[14] In their study “Elements of Cost and Schedule Overrun in Construction Projects”, time and cost overrun had been a major frequent problem of construction industry. They concluded that land acquisition, tender cancellation, weak contractor mobilization, equipment erection, fund constraints, law & order problem, delay in supply of equipment, scope change, forest clearance, slow construction progress, and cost escalation were the main source of delay and overruns.

[13] in their study of “Causes of Cost Overrun in Construction”, they indicated that cost over is as a headache of the industry in India. Questionnaire survey and desk study was adopted to identify factors causing cost overruns. By using spearman’s rank correlation test the respondents had similar perceptions on causes of cost overruns. Finally, they conclude “slow decision making, poor schedule management, increase in material/machine prices, poor contract management, poor design/ delay in providing design, rework due to wrong work, problems in land acquisition, wrong estimation/ estimation method, and long period between design and time of bidding/tendering”.

[11] In their study “Project Cost Overrun in Infrastructure Project: Indian Scenario”, they found that slow decision, poor design, inflation in material price, machine prices, poor contract and management, delay in design, rework due to wrong work, land acquisition, incorrect estimation and estimation method were the major causes of cost overrun.

Indian infrastructure projects are known for time and cost overruns. For example, Bandra-Worlisea link project, it’s planned was Rs 300 crores to be completed by 2004, but it final cost Rs 1,600 crores with a delay of five years. Hardily, very few projects complete on time and cost, but the extent was not studied. Privatization of public service and build operate and transfer (BOT) is also recommended for constructing of national highways to avoid the problem. Technical and natural factors, contractual failures, organisational or institutional failures, time overruns and economic factors were causes of the problem. The study was aimed at investigating the causes of delays and cost overruns in publically funded infrastructure projects in India [9].

According to [5] high transportation cost, change in a material specification, escalation of material price, frequent breakdown of construction plants and equipments, and rework are the major causes of cost overruns in Indian construction.

2.3 Causes of Time Overruns

[14] In their study "Elements of Cost and Schedule Overrun in Construction Projects", time and cost overrun had been a major problem in construction industry. They concluded that, delay due to land acquisition, delay happening in equipment erection, inadequate contractor mobilization, delay in forest clearance, fund constraints, scope change, delay in supply of equipment, law & order problem, tender cancellation, slow construction progress, cost escalation in were the major causes of delay and overruns.

In the study of "Delay in Execution of Infrastructure Projects–Highway Construction", [6] their study was based on 53 causes and 11 effects of delay of Highway construction projects. They grouped the factors cause delay in to owners related, contractor related, consultant related, services and utilities related, Government regulations related, and external environment related. They concluded the major causes of delay related to contractors were ineffective construction method and implementation, Shortage of materials, Payment problems between a contractor and his employees. The major causes related to the owner were interference by the owner during execution operation, delay in decision making by the owner, delay in progress payments by owner. The main problems related to consultants were due to lack of experience. Delay causes related to services and utilities were the most critical factors as indicated by the high values of their severity means.

[7] Their study was based on completed road construction projects in Jordan from 2000-2008. They concluded that terrain conditions, weather conditions, variation of order, and availability of labor were the major causes cost and time overrun which ranges 101% to 600% and 125% to 455% respectively.

[2] In his study 52 factors affecting time overrun was identified and he combined them into eight groups. By conducting field survey he concluded that Segmentation of the West Bank and limited movement between areas, political situation, progress payments delay by owner, lack of equipment efficiency, difficulties in financing project by contractor, personal conflicts among labors, poor communication by consultant with other construction parties, conflict between a contractor and other parties, award project to lowest bid price, and unreasonable project time frame by the owner were the top ten frequent factors affecting time overrun as seen from the contractors' view.

2.3.1 Types of Delays

It is important to understand the type of delays before analyzing construction delays whether additional time extension is warranted or not. Delays have internal or external sources on project process. Internal causes of delay include causes that come from the owner, consultants, contractors, and designers. External causes of delays are originated from outside of construction projects like utility, nature, suppliers, subcontractors, labor unions, government, companies, etc.

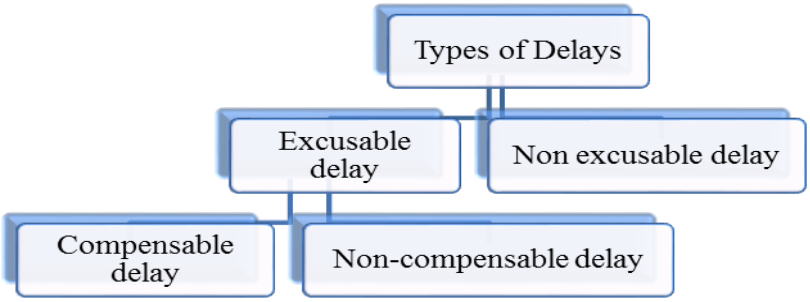

Fig. 1: Types of delays [3]

2.4 Effects of Cost and Time Overrun

In construction projects the triple project constraints, cost, time and quality are the expectations of the client. But construction industry is well known in Cost and time overruns. This is due to the nature of the industry i.e. it has different a complex activates, different parties and internal and external factors. These factors have negative impacts for the client, end users, participants and the industry as a whole. The client enforces to incur more money and wait for more time than what had been estimated.

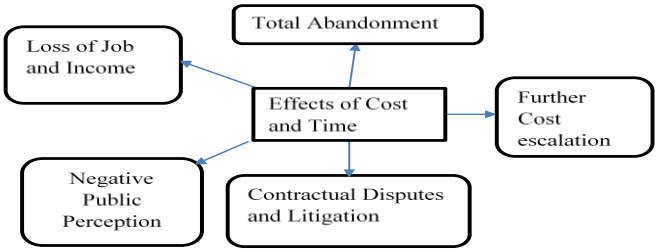

Fig. 2: Effects of cost and time overruns [26]

III. METHODOLOGY

Methodology is the way that applies to achieve research objectives. In this research work the methodology that applied to achieve the objective are following. 1) a through literature review of Related works and critical literature review, 2) factor identification from literature(Harvested)and discus with experts in the profession and commenting on it 3) preparation of a questionnaire based on identified factors, 4) pilot study of the prepared questionnaire to check its readiness and clarity to randomly selected respondents, 5) final structured questionnaire based on inputs of pilot study.

3.1 Method of Data Collection and Analysis

Questionnaire survey is one of the tools of data collection, where prepared questionnaires are sent to respondents to put their answer. This method of data collection is applicable where most researchers use in their survey, because it saves money, time and large data in the same time. The following are examples which had used a questionnaire in their studies, [1][4][23][24][25] etc. Questionnaire survey was used to collect the data from the construction firms (client, contractors and consultants) to rate based on their experience from the given five point Likert scale ('5' is extremely important and '1' is not important,).The questionnaire has 90 factors (16 for cost overruns and 74 for time overruns). It was distributed to 90 respondents (contractors, consultants and client) and 65 responses were received. The collected data were analyzed by Relative Importance Index method (RII) using MS excel 2013 statistical package.

$$\text{Relative Importance Index (RII)} = \frac{\sum W}{A * N} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots Equation\ 1$$

Where; W= Weighting given to each cause by respondent ranges from 5to 1 where ('5' is extremely important and '1' is not important), A = Highest weight i.e. '5'

N= Total number of respondents

The respondents will be of three firms, for same question it may have different ranks due to different RII value. To avoid such problems Weighted Average is will be adopted.

$$\text{Weighted Average} = \text{WaXa} + \text{WbXb} + \text{WcXc} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots Equation\ 2$$

Where; W= Relative weight (%), X=Relative Importance Index, a, b & c represent contractor, consultant and client respectively.

IV. RESULTS AND DISCUSSION

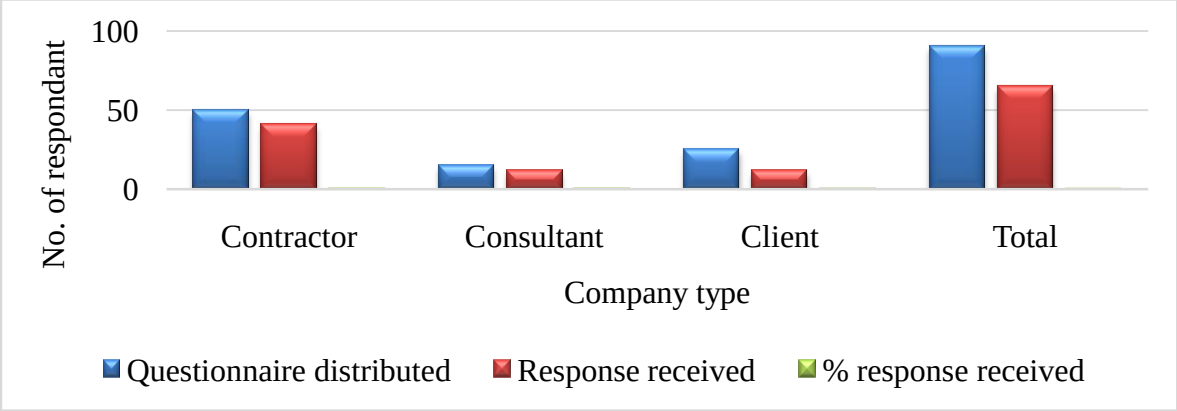

Fig. 3: Respondents proportion and response received

Table 2: Respondents work experience

Work experience	0-5 years	6-10 years	11-15 years	>=16 years
Contractor	17	11	4	9
Consultant	5	5	2	-
Client	6	2	3	1

4.1 Factors Affecting Cost overruns of Road Construction Projects

The collected data were analyzed using MS excel 2013 and ranked accordingly. Following are the discussion analysis result.

a) Contractors perspective

Factor difficulty in land acquisition ranked in the first position with RII value of 0.795. This means shows that to acquire land is very difficult so that it can affect the cost of the project. It is known that if there is delay in acquiring the land it will definitely affects the overall cost of the project. Result of this study matches with studies by [8] and [14]. So that this problem is a serious problem in most areas that can affect the project cost from what had been estimated. Design change and Fluctuations in the cost of materials are in the second from contractor perspective with RII Value of 0.741 to affect cost overrun in road construction projects in Gujarat. Shifting of existing utilities is ranked as fourth factor with RII value 0.727. Shifting existing facilities can cause more extra costs other than the estimated because of it takes time to shift and reinstall and laborious act. The facilities like water-pipes, electric poles and cables, ditches, etc.

Inadequate review for drawings and contract documents and indecision by the supervising team in dealing with the contractor's queries resulting in delays are ranked fifth. In this if contract document is not well-prepared and decisions are weak it is necessarily that the overall cost of the project will increase.

Lack of cost planning/monitoring during pre-and post-contract stages raked seventh having RII value 0.717. If there is lack of cost planning it affects the overall cost of the projects, so that planner or quantity surveyors should estimate very well and it should update and follow-ups continuously.

b) Consultants' perspective

According to the contractors' perspective, difficulty in land acquisition is ranked in the first having RII value of 0.933. In this case it is clearly shows that if there is difficulty in land acquisition it is necessarily to have cost overrun because many things are related with that so the cost will definitely increase. Design change has the second rank in the consultants' perspective with RII value 0.883. If there is design change most of the time the cost of the project will increase either due to rework, errors in design or due to waiting till design modification is done. Third rank is inadequate review for drawings and contract documents with RII value 0.85. If the document has ambiguity, it will lead to miss understanding and leads to cost overrun. Designers should give great care to what they have designers and contract documents should be revising it before sent to a user and should be clear and unambiguous. Lack of cost planning/monitoring during pre-and post-contract stages is ranked in the fourth having RII value of 0.8. If this problem happens, it is necessarily that to have cost overrun, so concerned bodies have to update continuously and monitor routinely.

c) Clients' perspective

According to clients' perspective "Difficulty in land acquisition" is ranked first having RII value of 0.850. This factor highly maters. This is the most common problem because it is difficult to acquire land that has been owned by others. That may be happening because of less compensation for land owners or weak awareness of the people. The second rank is lack of cost planning/monitoring during pre-and post-contract stages having RII value of 0. 750. Design change is ranked in the third having RII value of 0.733. Inadequate review for drawings and contract documents is ranked as third with RII value of 0.733.

Table 4: Major factors affecting cost overruns

Factor	Contractor		Consultant		Client		Weighted Average	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Difficulty in land acquisition	0.795	1	0.933	1	0.85	1	0.831	1
Is design change affects the cost?	0.741	2	0.883	2	0.733	3	0.766	2
Inadequate review for drawings and contract documents.	0.722	5	0.85	3	0.733	3	0.748	3
Lack of cost planning/monitoring during pre-and post-contract stages	0.717	7	0.8	4	0.75	2	0.738	4

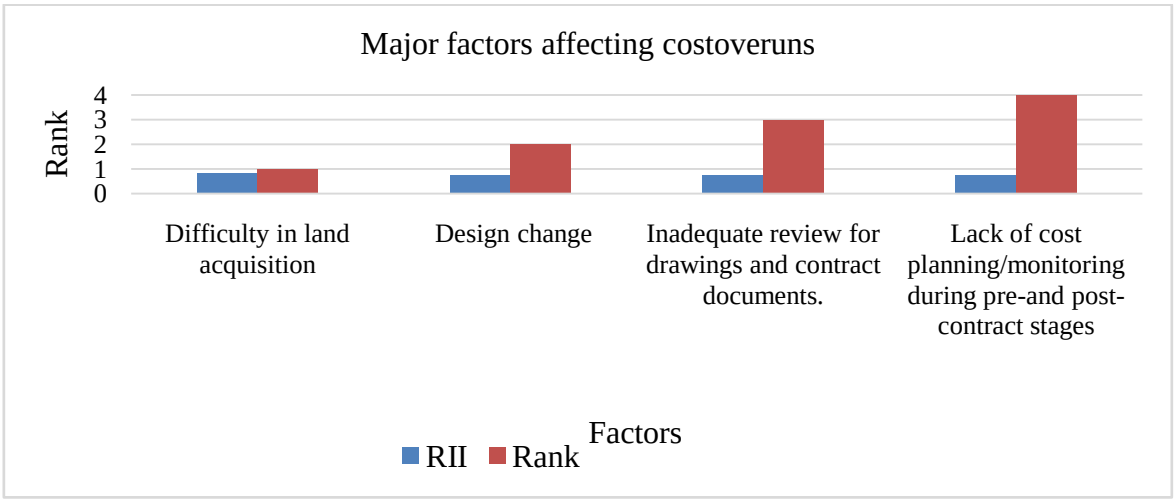

Fig. 5: Major factors affecting cost overruns

4.2 Factors affecting time overruns of Road Construction Projects

Following deals discussions about the factor that causes time overrun in road construction projects in Gujarat.

a) Contractors perspective

Conflicts in sub-contractors' schedule in execution of projects with the Contractor and Conflicts between consultant and design engineer is ranked first having RII value of 0.766. Delay in approving major changes in the scope of work by consultant is ranked in the third with RII value of 0.761. The fourth rank is difficulties in financing project by contractor with RII value of 0.756. Slowness in decision making process by owner is ranked in the fifth with RII value of 0.751.

b) Consultants' perspective

From contractors' perspective analysis result delay in progress payments by owner ranked first with RII value 0.867. The second factor that cause delay by the consultants' perspective is that damage of sorted material while they are needed urgently with RII value 0.8. The third factor is Slowness in decision making process by owner with RII value0.783. Traffic control and restriction at job site is ranked fourth with RII value 0.767.

c) Clients' perspective

Conflicts in sub-contractors' schedule in execution of project Contractor and Mistakes and discrepancies in design documents are the first factors that cause delay with RII value of 0.75. Rework due to errors during construction is the second factor that can cause time overrun with RII value of 0.733. Errors during construction can lead to time overruns because time is wasted in the first work. Slowness in decision making process by owner, Poor site management and supervision by contractor, Ineffective planning and scheduling of project by contractor, Effects of subsurface conditions (Like: high water table, etc.) are ranked in the fourth with RII value of 0.717.

Table 5: Major factors affecting time overruns

Factor	Contractor		Consultant		Client		Weighted Average	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Slowness in decision making process by owner	0.751	5	0.783	3	0.717	4	0.751	1
Conflicts in sub-contractors' schedule in execution of project Contractor	0.766	1	0.683	15	0.75	1	0.748	2
Original contract duration is too short	0.732	6	0.717	7	0.683	9	0.72	3
Rework due to errors during construction	0.717	16	0.7	11	0.733	3	0.717	4
Conflicts between consultant and design engineer	0.766	1	0.583	43	0.617	30	0.705	5
Poor site management and supervision by contractor	0.702	20	0.683	15	0.717	4	0.702	6
Delay in approving major changes in the scope of work by consultant	0.761	3	0.6	38	0.567	53	0.695	7
Is shortage of labours affects the time?	0.722	12	0.617	31	0.683	9	0.695	7

Limited construction area	0.707	19	0.733	6	0.6	35	0.692	9
Delay to furnish and deliver the site to the contractor by the owner	0.727	7	0.617	31	0.65	16	0.692	9
Wrong selection of equipment	0.712	17	0.717	7	0.6	35	0.692	9

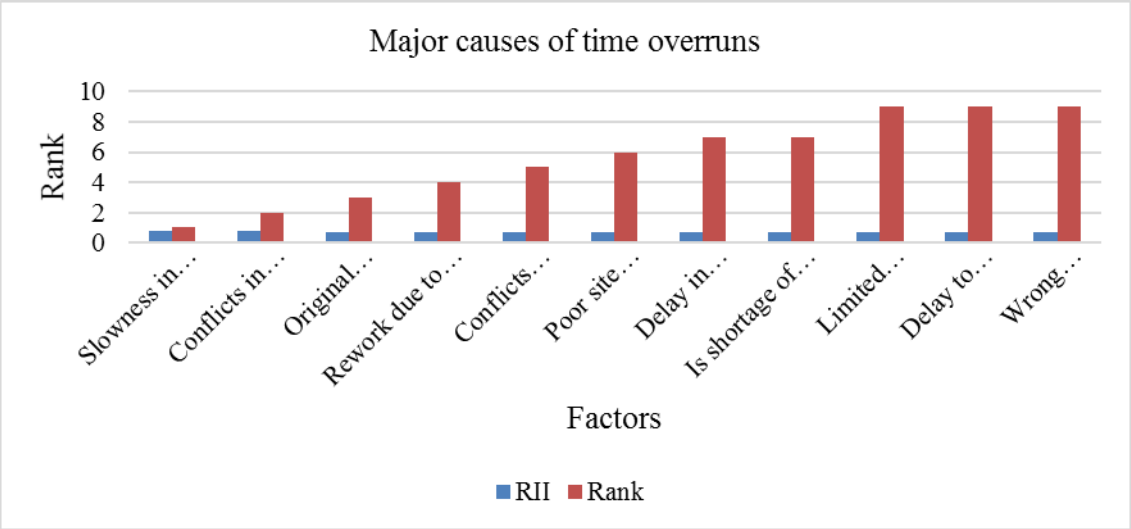

Fig. 6: Major factors influencing time overruns

4.3 Testing agreements between the Respondants on the factors affecting of cost and time overruns

The purpose of this test is to avoid being deceived by chance of occurrences. It helps to test if there is agreement between the respondents about the ranking of factors affecting cost and time overrun of road construction project in Gujarat.

H0: there is no agreement in the ranking of factors contributing for cost and time overrun between pair of respondents (owner versus contractor, owner versus consultant and contractor versus consultant).

H1: there is agreement in the ranking of factors contributing for cost and time overrun between pair of respondents' (owner versus contractor, owner versus consultant and contractor versus consultant).

The Spearman (rho) rank correlation coefficient is used for measuring the differences in ranking between two groups of respondents scoring for various factors (i.e. clients versus consultants, clients versus contractors, and consultants versus contractors).

$$\text{Rho}(\rho\text{cal}) = 1 - \frac{6\sum d^2}{N(N^2-1)} \quad \text{Equation 3}$$

Where: Rho (ρcal)–Spearman rank correlation coefficient

d–The difference in ranking between each pair of firms

N–Number of factors (observations)

To accept or reject the null hypothesis, consider 95% (P = 0.05 significance level). This is used to know the level of agreement between the respondents'. See table 5.6 for illustration.

Table 6: Correlation between the respondents on factors affecting cost overrun

Respondents	Rho (ρcal)	Critical value of ρ	Significance for P < 0.05	Rejected/Not Reject null hypothesis
Contractor Vs Consultant	0.204	0.538	Not significant	Not Rejected
Consultant Vs Client(Gov't body)	0.763	0.538	Significant	Reject

Contractor Vs Client (Gov't body)	0.218	0.538	Not significant	Not Rejected

From the table above, we can conclude that at 95% (P = 0.05 level of a significance), calculated rho (ρ) value for Consultant Vs Client (Gov't body) is greater than that of critical rho (ρ) value, the null hypothesis is rejected. This means, there is significant agreement (similar perception) in ranking between the respondents on the factors affecting cost overrun in construction road projects in Gujarat.

Contractor Vs Consultant and Contractor Vs Client (Gov't body) have less than the critical rho (ρ) value, so the hypothesis that there is no significant agreement between the respondents is accepted. Meaning, Contractor Vs Consultant and Contractor Vs Client (Gov't body) has different perceptions in ranking the factors affecting cost overrun in construction of road projects in Gujarat

Same consideration is also taken for factors affecting time overruns of road construction projects in Gujarat as in the above for factors affecting road construction projects in Gujarat.

Table 7: Correlation between the respondents' on factors affecting time overruns

Respondents	Rho (ρcal)	Critical value of ρ	Significance for P < 0.05	Rejected/Not Reject null hypothesis
Contractor Vs Consultant	0.203	0.232	Not significant	Not Rejected
Consultant Vs Client(Gov't body)	0.229	0.232	Not significant	Not Rejected
Contractor Vs Client (Gov't body)	0.369	0.232	significant	Reject

Calculated rho(ρ)values of Contractor Vs Consultant and Consultant Vs Client (Gov't body) are less than the critical rho(ρ)value, so the hypothesis that there is no significant agreement between the respondents (H0) is not rejected. Meaning they have the same perception in ranking of these factors. Calculated rho (ρ) value of Contractor Vs Client (Gov't body) is greater than the critical rho (ρ) value, so the hypothesis that there is no significant agreement between the respondents is rejected, i.e. alternative hypothesis is accepted. Therefore, it can be concluded that the respondents (Contractor Vs Client (Gov't body) has similar attitudes in ranking the factors affecting timeoverruns in road construction projects in Gujarat.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Based on the study results, the following conclusions are given.

1. Reports of completed and ongoing construction projects in India has experiences of cost and time overruns [15], [16], and [18] are examples, but there is improvement for the last ten years decreases to 10.93% and 21.8% for cost and time overruns respectively.
2. It has identified that there 90 factors (16 for cost overrun cause and 74 for time overrun causes) and the major causes are *difficulty in land acquisition, design change, inadequate review for drawings and contract documents, and lack of cost planning/monitoring during pre-and post-contract stages* and *slowness in decision -making process by owner(gov't body), conflicts in sub-contractors' schedule in execution of the project contractor, original contract duration is too short, rework due to errors during construction, conflicts between consultant and design engineer, poor site management and supervision by contractor, delay in approving major changes in the scope of work by consultant, shortage of labours affects, limited construction area, delay to furnish and deliver the site to the contractor by the owner, wrong selection of equipment* for cost and time respectively.
3. There is a strong correlation in ranking between the Consultant Vs Client (Gov't body) for the factors affecting cost overruns and Contractor Vs Client (Gov't body) for factors affecting time overruns in road construction projects in Gujarat.
4. Cost and time overruns has many effects not only to the stake holders, but also to the industry as a whole. Following are the most common effects of cost and time overruns, source of further cost escalation and time, contractual disputes and litigation, negative public perception, loss of job and income, total abandonment.

5. Difficulty in land acquisition is the major factor that affects cost overruns and time overruns that is similar with analysis of different literatures from different countries. In India the construction starts in 80% land acquisition and remaining 20% acquires after when construction is ongoing. This land acquisition is a headache in most areas of the world.

5.2 Recommendations

The following recommendations are given for the major factors affecting cost overruns.

1. Results of the analysis show that difficulty in land acquisition ranks in the first. This factor is a headache of most areas that affects the project from attaining its expected goal. If land is not acquired all related things that has to be done will be getting delayed and charges extra unnecessary cost for not unused items like machines, labours, etc. So the researcher recommends land should be acquired as early as possible before commencing the project. Gov't should clear the process for the land acquisition early when project is proposing in that area.
2. Design change is the second major factor that highly affects cost overruns. If design changed all components will get changed so that it necessities to increase the cost relatively. So it is recommended that designers should design as per the client's requirement so that the chance of changing will be decreased and the client should also clearly let to the designer.
3. Inadequate review for drawings and contract documents is place in the third rank of the analysis result. If drawings and contract documents are not adequately reviewed, it will create ambiguity and confusions, because a small mistake in drawing will have great impact on the overall project cost as well as related things behind it. So it is recommended that drawings and contract documents should be adequately revised and checked before deliver to contract, because the implementation of the work is guided and implemented by the drawing and specifications in the contract document. Therefore, priority should be given to drawing and contract documents as they are the governing rules in the project implementations.
4. Lack of cost planning/monitoring during pre-and post-contract stages is the fourth rank in the analysis result. If costs are properly planned and monitored in all the stages of the construction stages, it will lead to more extra charges. Cost should be well estimated and monitored in all the stages of the construction phases so that cost overrun will not happen. So, it is recommended that cost planning and monitoring should be strictly monitored and follow ups in all stages of the construction.

The following recommendations are given for the major factors affecting time overruns.

1. Slowness in decision - making process by owner/client ranked in the result of the analysis for factors affecting time overrun. If the decision is slow, it is necessary that to happen delays in the progress of the construction work. A client plays an important role in decision making as per requirement. So, clients should announce his/her or their decision on time.
2. Conflicts in sub-contractors' schedule in execution of a project Contract is ranked in the second. If the schedule of the main and sub-contractor is not in line because of different reasons it will lead to delay or schedule overruns. To reduce this problem schedule of the main and subcontractors should be inline. In other words, when the main contractor transfers the contract to the sub-contractor, he/she has to confirm that the schedule is in line with what they have scheduled otherwise it will get completed behind the schedule and leads to other extra impacts.
3. Original contract duration is too short cause time overrun. If the contract duration estimated is not fair relative to the quantum of work or don't consider the constraints the contact duration will be short but in practical to the reverse. So, quantity surveyors and owners should consider the quantum of work and real situations when estimating the contract durations.
4. Rework due to errors during construction is the fourth major factor causing time overruns. Errors may happen due to many reasons like misunderstanding of documents, drawings, lack of capacity, complexity of the situation, etc. To avoid this problem, it is recommended that assign a right person for a right job, read and understand prior to works and if there is confusion ask experts before starting the work.
5. Conflicts between consultant and design engineer is the fifth major factor affecting time overruns. Consultants and design engineers as a participant of the project there may have conflicting interests even though they are working together. To avoid/

reduce these consultants and design engineer should have common ground that avoid their conflicting interests and they should have to avoid the conflicting interest and work as a team when necessary.

6. Poor site management and supervision by contractor is sixth major delay causing factor. If the management of the contractor is not effective, it will lead to delays. For example, if resources are not properly managed, it will affect tracking of the materials not to avail on time. So, it is recommended to introduce effective and integrated site management and strict follow-ups supervisions should be done by the contractor to avoid delay.
7. Delay in approving major changes in the scope of work by consultant is the seventh major factor causing time overrun. If the consultant or third - party is not approved the major changes and gave to contractors it causes delay for the projects. So consultants are recommended to approve early any major changes for scope.
8. Shortage of labours is the 8th major factor causing delays. In areas where labours are not available projects will get delayed. So contractors/clients should have recommended to give extra charges to get motivated labours so that work will be got completed early as possible.
9. Limited construction area is one of the major factors affecting time overruns. This can happen when the construction is in cities, towns, in hilly areas, farm fields, etc. Contractors are recommended to track items in a very orderly manner in which either existing road should not blocked or the movements of the work.
10. Delay to furnish and deliver the site to the contractor by the owner is the tenth factor causing time overruns. This factor is a headache of most areas that affects the project from attaining its expected goal. If land is not acquired all related things that has to be done will be got delayed and charges extra unnecessary cost for not unused items like machines, labours, etc. So, the researcher recommends land should be acquired as early as possible before commencing the project. Gov't should clear the process for the land acquisition early when project is proposing in that area.
11. Wrong selection of equipment is the 11th factor causing time overruns. If the selected equipment is not fitted to accommodate many jobs, it is necessary to supply equipment's that fits to a particular job. So contractors are recommended to select equipment when they are hire or purchase they should have to confirm that particular equipment should be versatile that can do different jobs.

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