



## Factor affecting cost & schedule overrun on construction site.

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**Abstract :** As we known that the construction industry of India is facing huge problem with cost & schedule overrun on construction site. A construction project will be called successful when it is completed within budgeted cost & schedule time. The purpose of this thesis is to look on to foremost factor which causes cost overrun and delay on construction site and also to know the point of view from Project Manager, Contractor and Engineer about what are the best method that we can apply to complete the project on estimated cost and schedule time with proper safety. The research focuses on the construction sites in Mehsana city. The result of this thesis is conducted through frequency index method this can help the construction companies to make improvement in controlling the cost and schedule overrun on construction project.

**IndexTerms** – Cost overrun, Schedule overrun, Construction projects, Delay, Causes

### I. INTRODUCTION

As we are known that Indian Construction Industry is one of the huge sector for growth and development in India. The industry plays a crucial role in developing the country's base and also consider as a huge generator of employment opportunities. Indian construction industry contributes more than 9% to the GDP. Construction industry GDP in India increased from 2670.74 INR billion to 3382.83 INR billion within first quarter of 2022. Construction industry all over, the Indian Construction industry also face a several challenges from acquiring land issue, shortage of skilled person, design issue and increase labor and material cost. To complete the project within budgeted cost and schedule, generally quality of the construction project is compromised. As a result of the current value of raw material and cost of labor and the market condition most of the contractor are increasing their amount by between 6% to 10%. This amount increase is reflected in landmark development and higher tender prices. When a project is completed at a cost higher than budgeted cost, that is called budget or cost overrun. There are many examples in India where, the construction industry had failed in completion of the projects in expected planned time. There are 563 project are reported as delay. Out of 563 project 100 project have overall delay in the range of 1 to 12 months, 120 projects have overall delay in the range of 13 to 24 months, 216 project delay in the range of 25 to 60 months, 127 project delay in the range of 61 months and above, average time overrun in these 563 delayed projects is 47 months.

### II. OBJECTIVES

- To identify various factors that significantly influences cost and time overrun.
- To find out some of the root causes that affect budget & schedule overrun on construction sites & how to minimize it.
- To find how frequently these root causes generate.
- To identify how overrun affect owner and contractor.

### III. RESEARCH METHODOLOGY :

#### 1) LITERATURE REVIEW:

Literature review was done from previously published research paper on this topic from various international journals to know the previous work done on this type projects.

#### 2) DATA COLLECTION:

Data collection done by questionnaire survey after identification of various factors from literatures and opinions of experts. Questionnaire will be prepared for the construction professionals in construction companies, consultancies for identify their views on cost & schedule overrun on construction projects.

#### 3) DATA ANALYSIS:

Data analysis done on how respondent's respondents rate the questions by the various parameters based on their own experience and knowledge.

### IV. LITERATURE REVIEW

- Anant Narayan Shete, Vaibhav Durwas Kothawade (Nov 2016):

This paper states various causes of cost & schedule overrun on construction projects. A questionnaire survey is prepared & is circulated to various constructing firm for knowing the view from personnel regarding cost & schedule overrun on construction projects. The aim of this research is to find the causes that affect overrun in any construction projects. Also, the older literature paper & article is been studied to know the critical success factor that help in avoiding the overrun. Also, for this research case study has been done on building project and from the responses it has been seen that most

of responders think that cost overrun is a major problem. Some of the causes are identified like external factor, inflation & escalation of material prices, more competition.

- Shubham S. Deshmukh, Shubham D. Menkudle (April 2019):

The purpose of this research paper is to find some of the reason that affect budget & schedule overrun on construction sites & how to minimize it. The existing literature paper & other research have been done and it has been found that two main components are time & cost overrun. Various factors have been identified like improper material procurement, political issues, material handling, manpower productivity, lack of detail in drawing, increase in scope of work from client are significant causes that lead to time & cost overrun in construction industry.

- Chhavi Gupta, Chitraranjan Kumar (Oct 2020):

As we are aware that construction industry is the bigger sector for economic growth in India. A project is said to be successful if it completed within a time and as per budget. The main purpose of this study is to identify root causes of time and cost overrun and also to take essential measures to mitigate it. A literature paper has been studied to find the causes of budget & schedule overrun. By keeping in mind the causes a question survey form has been created & floated to various construction personnel. The responses that have been gathered are check by using RII method to rank the causes. By ranking the factors various factors have been noticed i.e. financial problem from contractor side, less labour available, less available of material on site, increasing rate of material, error in execution of work, higher charges on arrival of material. These causes should be kept in mind while planning, designing and execution phase

## V. METHODOLOGY

### 5.1 DATA COLLECTION :

#### 5.1.1 GENERAL :

- Data collection, which may be divided into two categories, quantitative approach and qualitative approach, generally refers to a plan of action that allows the objectives of the study to be questioned.
- Qualitative and quantitative approaches are the two categories into which the information received is split in order to create a plan that can be reviewed in order to accomplish the study goal
- The less systematic research method known as a qualitative survey is used to gather information about people's innermost thoughts and sources of inspiration

#### 5.1.2 SURVEY PLANNING :

The Survey are sent through email and online platform is used for data collection work. The main goal is gathered information of factors affecting tower crane performance in high rise building.

#### 5.1.3 QUESTIONNAIRE DESIGN :

To obtain the opinions of diverse respondents in the construction business, questionnaire surveys were undertaken. The results of the survey are utilized to enhance the capabilities of construction MSMEs.

1	2	3	4	5
Very Low	Low	Medium	high	Very High

Table 1. Liker Scale

#### 5.1.4 DETERMINATION OF QUESTIONNAIRE & SAMPLE SIZE DETERMINATION :

Several Owners, Engineers, Partners, and Project Managers received the questionnaire after being informed of the study's goals and having their agreement to participate in the study sought. Once the respondents in Ahmedabad demonstrated their initial consent. Calculator.net is used to determine the sample size. Here 98% confidence level is taken.

e is the sampling error to be estimated is 12%

### Sample Size Calculator

#### Find Out The Sample Size

This calculator computes the minimum number of necessary samples to meet the desired statistical constraints.

#### Result

Sample size: **95**

This means 95 or more measurements/surveys are needed to have a confidence level of 98% that the real value is within  $\pm 12\%$  of the measured/surveyed value.

Confidence Level: ①	98% ▼
Margin of Error: ②	12% ▼
Population Proportion: ③	50% Use 50% if not sure
Population Size: ④	Leave blank if unlimited population size.
<input type="button" value="Calculate"/> <input type="button" value="Clear"/>	

Figure 1: Sample Size

Table 1: Factors of Schedule overrun

Sr No.	Schedule overrun Factors
1	Shortage of Material
2	Poor Quality of Material
3	Late Delivery of Material
4	Change in Type and Specification of Material
5	Unavailability of Equipment
6	Breakdown of Equipment
7	Low Productivity of Equipment
8	Late Delivery of Equipment
9	High Cost of Equipment Maintenance
10	Payment Delay for Ongoing Work
11	Increase Price of Material and Equipment
12	Financial Difficulties by Contractor
13	Productivity of Labor
14	Shortage of Experienced Labor
15	Relationship Between Management and Labor
16	Poor Site Management and Supervision
17	Inaccurate Time and Cost Estimate
18	Inaccurate Time and Cost Estimate
19	Incomplete Design at the Time of Contractor
20	Rework Due to Mistake during Construction
21	Design Changes by Owner
22	Delay in Approving the Document
23	Additional Work
24	Inadequate Planning and Scheduling
25	Stoppage of Work due to Rejection by Owner
26	Weather Condition
27	Social and Cultural Factor

Table 2: Factors of Cost Overrun

Sr No.	Cost overrun Factors
1	Increase Price of Material and Equipment
2	High Transportation Cost
3	High Cost of Machinery
4	wastage of Material
5	High Maintenance cost of Equipment

6	Breakdown of construction Plant and Equipment
7	Rework because of Mistake during Construction
8	Additional Work
9	Inadequate planning and Scheduling on construction site
10	Inadequate planning and Scheduling on construction site
11	Shortage of Specialist Persons
12	Inadequate method for Bill of Quantities
13	Incorrect Method for Calculating original Cost
14	Unavailability of Equipment
15	Inadequate method of Construction
16	Lack of Cost Planning, Controlling and Monitoring during Contract Stages
17	Incorrect Preparation and Planning by contractor
18	Poor Site Management and Supervision Skills
19	Contractual Claims

## 5.2 DATA ANALYSIS :

- A formula is used to rank causes of cost overrun and schedule overrun based on frequency of occurrence of identified by the participants.

$$F.I. (\%) = \sum [a \times (n / N)] \times \left( \frac{100}{5} \right) \%$$

where,

a = constant weight given to each response (range from 1 to 5)

n = frequency of the index and

N = total number of responses

### 5.2.1 SAMPLE SIZE DETERMINATION :

No. of Questionnaire distributed	Total Responses	Responses in %
95	92	96.84 %

Table -3: Details of Responses

### 5.2.2 RELIABILITY TEST :

- A researcher study's or a measuring test's consistency is referred to as its reliability. Under this work, Excel was used for analysis using CRONBACH'S  $\alpha$  method.

Table 3: Reliability Test Result for schedule overrun

$$\alpha = \frac{K}{K-1} \left[ 1 - \frac{\sum s^2 y}{s^2 x} \right]$$

Where,

K = Number of the test items

$\sum s^2 y$  = Sum of the item variance

$s^2 x$  = Variance of the total score

Variables	Description	Values	Internal Consistency
K	No. of items	26	<b>Good</b>
$\sum s^2 y$	Sum of the item variance	29.25	
$s^2 x$	Variance of total	107.739	
$\alpha$	Cronbach's alpha	0.75	

Table 4: Reliability Test Result for Cost overrun

Variables	Description	Values	Internal Consistency
K	No. of items	19	<b>Good</b>
$\sum s^2 y$	Sum of the item variance	22.86	
$s^2 x$	Variance of total	72.08	
$\alpha$	Cronbach's alpha	0.72	

### 5.1 FI & RANKING OF FACTORS AFFECTING COST AND SCHEDULE OVERRUN:

Table 5: FI and Ranking of Schedule overrun

Sr No.	Factors	Frequency Index (FI)	Rank
1	Shortage of Material	86.32	2
2	Poor Quality of Material	69.89	9
3	Late Delivery of Material	73.68	4
4	Change in Type and Specification of Material	71.16	8
5	Unavailability of Equipment	98	1
6	Breakdown of Equipment	67.16	13
7	Low Productivity of Equipment	73.89	3
8	Late Delivery of Equipment	73.26	5
9	High Cost of Equipment Maintenance	67.15	15
10	Payment Delay for Ongoing Work	69.26	10
11	Increase Price of Material and Equipment	68.63	11
12	Financial Difficulties by Contractor	72	6
13	Productivity of Labor	72	7
14	Shortage of Experienced Labor	68	12
15	Relationship Between Management and Labor	67.16	14
16	Poor Site Management and Supervision	59.39	20
17	Inaccurate Time and Cost Estimate	63.15	16
18	Delay in Decision Making	59.59	18
19	Incomplete Design at the Time of Contractor	58.32	23
20	Rework Due to Mistake during Construction	56.63	25
21	Design Changes by Owner	61.89	17
22	Delay in Approving the Document	58.11	24

23	Additional Work	59.37	21
24	Inadequate Planning and Scheduling	58.95	22
25	Stoppage of Work due to Rejection by Owner	59.58	19
26	Weather Condition	52.42	26
27	Social and Cultural Factor	43.79	27

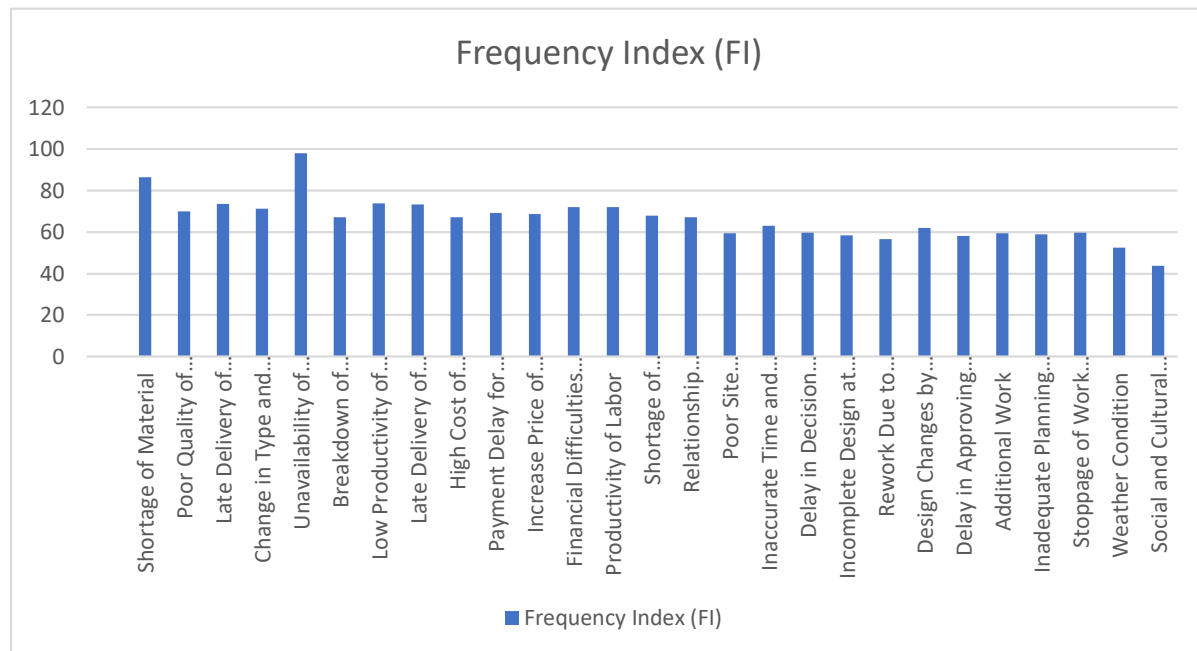


Figure 2:FI and Ranking of Schedule overrun

Table 6:FI and Ranking of Cost overrun

Sr No.	Factors	Frequency Index (FI)	Rank
1	Increase Price of Material and Equipment	87.87	1
2	High Transportation Cost	74.26	3
3	High Cost of Machinery	75.96	2
4	Wastage of Material	61.91	5
5	High Maintenance cost of Equipment	67.27	7
6	Breakdown of construction Plant and Equipment	63.92	9
7	Rework because of Mistake during Construction	65.74	8
8	Additional Work	64.04	6
9	Inadequate planning and Scheduling on construction site	65.32	11
10	Poor Coordination and Communication between other	60	4
11	Shortage of Specialist Persons	63.52	17
12	Inadequate method for Bill of Quantities	60.43	15
13	Incorrect Method for Calculating original Cost	60	16
14	Unavailability of Equipment	58.94	18
15	Inadequate method of Construction	60.64	12
16	Lack of Cost Planning, Controlling and Monitoring during Contract Stages	60.64	10
17	Incorrect Preparation and Planning by contractor	61.28	13
18	Poor Site Management and Supervision Skills	60.64	14
19	Contractual Claims	42.13	19



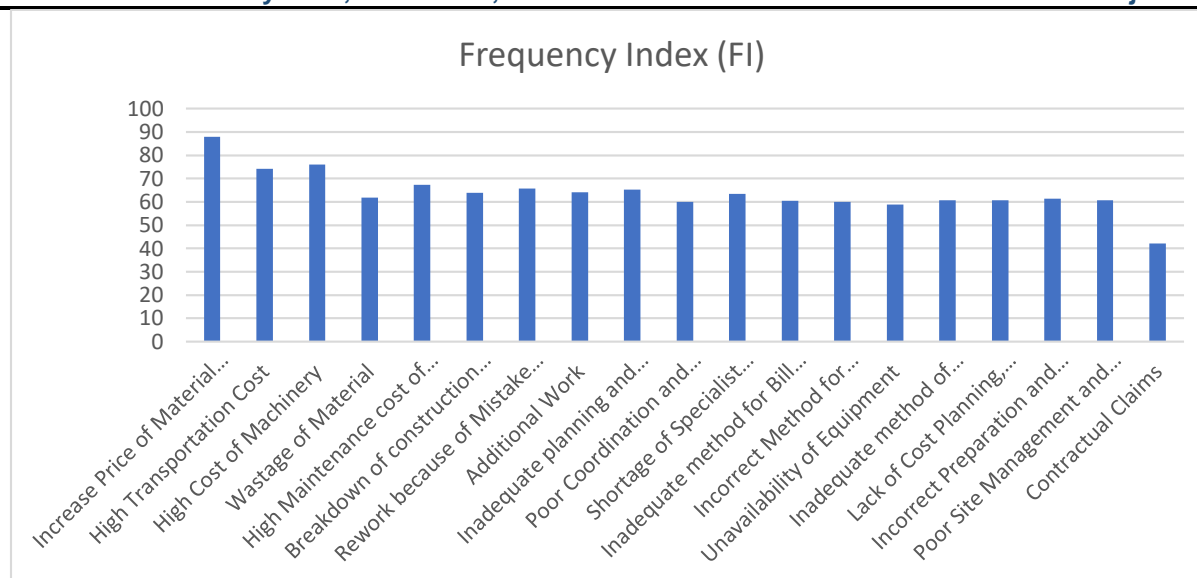


Figure 3: FI and Ranking of Cost overrun

### CONCLUSION:

This research was done to find the foremost factor that affect the cost and schedule overrun in construction site. I had found out the 26 factor for schedule overrun and 19 factor for cost overrun, the schedule and cost overrun were analysed by using frequency index method. The foremost factor that affects the schedule overrun are unavailability of equipment, shortage of material, low productivity of equipment, late delivery of material, late delivery of equipment, financial difficulties by contractor, productivity of labour, etc. The foremost factor that affects the cost overrun are increase price of material and equipment, high cost of machinery, high transportation cost of material and equipment, poor coordination and communication between other, wastage of material, additional work, high maintenance cost of equipment etc. The factor which was identified should be taken in mind to complete the project with a planned schedule and estimated cost. If we are all know that factors before starting the construction project then project team will prepare schedule very accurately and take precaution while tracking the project progress.

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### REFERENCES

- Bhat, Mohammad. Mujeeb. Ur. Rehman. 2019. "Factors Influencing Time and Cost Overruns in Indian Construction Projects." *International Research Journal of Engineering and Technology (IRJET)* 06(03): 4319–34. <https://www.irjet.net/archives/V6/i3/IRJET-V6I31144.pdf>.
- Gupta, Chhavi, and Chitraranjan Kumar. 2020. "Study of Factors Causing Cost and Time Overrun in Construction Projects." 9(10): 202–6.
- Memon, Aftab Hameed, Ismail Abdul Rahman, Noor Yasmin Zainun, and Ahmad Tarmizi Abd Karim. 2014. "Web-Based Risk Assessment Technique for Time and Cost Overrun (WRATTCO) – A Framework." *Procedia - Social and Behavioral Sciences* 129: 178–85.
- Mevada, Jay, and Ganesh Devkar. 2018. "Analysis of Reasons for Cost and Time Overrun in Indian Megaprojects." 02018(2017): 1–10.
- Patil, Jalindar. 2019. "International Journal of Advance Research in Analysis of Construction Project Cost Overrun by Statistical Method." *International Journal of Advance Research in Computer Science and Management Studies* 3(January): 349–55.
- Pirabahar, S. 2017. "A Study On Cost And Time Overrun And Its Preventive Measures In Building Construction Projects." (April): 462–65.
- Rauzana, Anita. 2021. "Analysis of Causes of Delay and Time Performance in Construction Projects." (October 2016).
- Senouci, Ahmed, Alaa Ismail, and Neil Eldin. 2016. "Time Delay and Cost Overrun in Qatari Public Construction Projects." *Procedia Engineering* 164(June): 368–75. <http://dx.doi.org/10.1016/j.proeng.2016.11.632>.
- Shehu, Zayyana, Intan R. Endut, and Akintola Akintoye. 2014. "Factors Contributing to Project Time and Hence Cost Overrun in the Malaysian Construction Industry." *Journal of Financial Management of Property and Construction* 19(1): 55–75.
- Tadewos, Shambel Gebrehiwot, and Dixit Patel. "Causes and Effects of Cost and Time Overrun of Road Construction Projects in Gujarat." : 1–11.