

# A Questionnaire Survey with the help of Likert Scale method on “Approach in the construction industry & Importance of Precast for completing the project on time”

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**Abstract:** This paper represents a questionnaire survey collected with the help of Google form, where we are applying a Likert scale method & points are given to formulate with the final output. We are considering the about completing the project within time. For that we will list down the basics approach needed in building any project from the start point, then we are sub-dividing according to our knowledge. In India we are experiencing significant delays in construction project. It is a large volatile and highly investment added up day by day. Due to improper planning, execution, which overall impacts the project and eventually it indeed occurs cost overrun. We are also focusing on precast technique for completing work within time and people having the background knowledge of precast and cast-in-situ for cost-effective work. Thus, with the help of the Survey we are able to find out the reason and the hurdles associated with a construction project.

**Index terms:** Precast, Cast-in-situ, Cost-effective, Cost overrun, Delay

## I. INTRODUCTION

Every construction project has their own goal and objective to achieve such as to meet the client requirement, cost, achieve the quality needed, and finish according to the planning time and others. Delay in the construction can be considered as one of the most recurring problems in construction industry. Two important issues of a construction project are the duration of a project for the constructor and the cost for the sponsor. Heuristic values and historical data are often used to determine both cost and project duration. The values are carried over by the stakeholders even after the scope of work is normalized and few details are signed off. One needs to keep in mind various factors while determining the ‘project duration’. <sup>[1]</sup>

Stakeholders who initiate the projects, are responsible for the finance, appointing designers and other approvals. They are responsible for determining project duration; factors influencing the decision are the market survey, economic, situation, project finances, end user demands, historical data and expert judgment. During execution of new project, team members often reinforce previously determined data on completion of time. However, new vendors join the project in between and questions the project duration as the timeline may not be realistic for their work. Thus, the basis of project completion time is debatable. <sup>[3]</sup>

In construction, the delay can be defined as either timeout over the date beyond which it has been agreed to delivery of the project stakeholder through the set at contract the end date. It is a project that overcomes the planned schedule and is regarded as a common problem of construction projects. It means production and rentable area attributable to the owner of the delay or loss of income due to lack of existing plant function. In some cases, it means that the delay is due to high overhead costs associated with long working hours, high material costs due to inflation and labor costs for contractors. <sup>[3]</sup>

Timely completion of a project is an indicator of efficiency, but the construction process is subject to many variables and unpredictable factors arising from many sources. These sources include involvement of the parties' performance, resource availability, environmental conditions, and contractual relationships with other parties.

## II. NEED OF STUDY

Due to the rapid growth in the India's construction field, it becomes necessary for the engineers and contractor to build the structure within the time duration within the budget. Thus, to do so we must know the fundamentals of any project site. It is essential to work on the primary planning and execution problems faced when implementing any construction work from start to end. <sup>[3]</sup>

## III. AIM

To collect the data with the help of Google form, where we are applying Likert scale method with the help of data and studying the current trend on construction site and factors affecting on construction project while implementing site job.

## IV. STUDY AREA PROFILE

Gujarat is the most industrialized state in India after Maharashtra and is located in western India, bordered by Pakistan to the northwest and Rajasthan to the north. Its capital is Gandhinagar, a planned city close to Ahmedabad, the former state capital and the commercial center of Gujarat.

**V.DATA COLLECTION**

In this Chapter we will mainly discuss regarding the determination of the sample size for the research work and the sample location where it to be taken and the application of the Likert scale method how it is going to work

**a. Sample Size Determination**

The Process of selecting or designs the selection of the item to use in the study analyze. A statistical calculation are used in order to calculate the sample size. Following formula is used to determine the sample size.

$$n = \frac{Nz^2 \times 0.25}{\{d^2 \times (N - 1)\} + (z^2 \times 0.25)}$$

Where,

n= sample size

z=confidence level

N=total population size

σ= standard deviation

d= precision level (usually 0.05 to 0.10)

Hence, sample size for the research work can be calculate by using equation given below.

If, z=1.96 (95% confidence level)

N= 140

d= 0.05 (at 15% precision level)

$$n = \frac{140(1.96)^2 \times 0.25}{\{(0.05)^2 \times (140 - 1)\} + (1.96^2 \times 0.25)}$$

n=127.097 n~128

Table 1 Value of 'z' with "corresponding level"

Confidence level	Value of Z
99.9	2.2905
99.7	3.0000
99.5	2.8070
99	2.5758
98	2.3268
95.5	2.0000
95	1.9600
90	1.6449
85	1.4395
80	1.2816

Table 2 Sample Size

Number of Samples	Numbers of Questionnaires to be Distributed	Number of Respondents	Number of valid Respondents
130	130	110	100

**VI.Likert Scale Method:**

A Likert scale is a psychological measurement device that is used to gauge the attitude, values and opinions. Its function by having a person to complete a questionnaire which they requires to indicate the extent to which they agree or disagree with series of statements. The Likert scale is named after the creator, Rensis Likert, the one who developed it in 1932. In survey research, Likert scales are most commonly use in scale.Likert scale questions are used in many different types of surveys, whether you are trying to find out how your employees feel about their work or what your customers think about your latest product.

To help you use Likert questions effectively, here is an example of how they can look:

- ✓ Customer satisfaction
- ✓ Overall, how satisfied or dissatisfied are you with our company?
- ✓ Very satisfied
- ✓ Somewhat satisfied
- ✓ Neither satisfied nor dissatisfied
- ✓ Somewhat dissatisfied

✓ Very dissatisfied

We will be giving points to the above response from -2 to +2 respectively and through which we will create an excel sheet from the data collected responses since creating pie & bar chart for our final conclusion.

Table 3 Rating for Likert Scale

Preference	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Scale	1	2	3	4	5
Rating	-2	-1	0	1	2

## VII. QUESTIONNAIRE DESIGN:

The information collected from literature review helped in achieving the study objectives were reviewed and formalized to a suitable form of study survey and after different stages of brainstorming, consulting & with aspects of objectives has been developed with closed-ended question.

A proper importance is given to avoid needless personal data, complex and duplicated question. The questionnaire has been prepared by covering the letter, which explains the purpose of the study; aim of the research and with the promise of security of the information in order to encourage higher response. The questionnaire contains one section in which it divided into nine parts to achieve the objectives of the research. Google forms are created to spread the questionnaire to the maximum number of persons related to infrastructure project.

By creating a Google forms sheet, which will be circulated to different people related to infrastructure construction industry. One to one & through email which will give us a vast number of feedback data from the collection. The Questionnaire is attach in the Appendix I. ([Click over here](#))

The answer has to be tick according to the Likert scale method and some of them are modify to fulfill the requirement. Few the question just have yes or no type of answer to keep it simple.

### STRUCTURE OF QUESTIONNAIRE:

#### Background information

This part contents of gather general information about the companies and respondents, to their classification in construction line along with name of the city, designation, work experience in the industry, type of work carried forward by them until date.

In part **One**, we will be asking the persons to answers the question, which are to be framed keeping in mind the current construction scenario and factor, associated with it.

**Planning and Licensing Project:** In this, Question are form in a statement that are major issue in big infrastructure project. What are the different major problems accrue file approving the project with the government. With the research, it has been seen that the people were facing the problem in land acquisition & land possession. While getting the subsidy amount from government is a problem too.

**Materials & Machinery:** In this, Question are based on a statement, which focus on materials management on the construction site. Overall storage and replacing the materials from one site to another. Sometimes the availability of the materials at lower cost is a major issue.

**Manpower:** In this, Question are based on a statement, which focus on labor management on the construction site. Accommodation of manpower at site is difficult and shifting them to another site is a major issue.

**Timely Completion:** In this, Question are based on a statement, which focuses on the fact that does the people complete the work within the time provided by the engineer. They have to answer that do they think that in India most of the project are delayed or not.

**Cost Overrun:** In this, Question are based on a statement, which focuses on the fact that does the people complete the project work in overall budget given to them.

**Difficulty due to executing the project in/to public:** In this, Question are based on a statement, which focuses on the surrounding place of constructions site that impact the environmental issue. Even creating the traffic or not. Disturbing the nearby area while ongoing project performing big infrastructure project.

**Safety in Infrastructure:** In this, Question are based on a statement, which focuses on the safety be adopted on construction site. Do engineer gets enough funding to practice the safety rules on the site. Do they think that safety plays an important role in project completion overall time & practice safety for manpower or not.

In part **Two**, we will be asking the persons to answer the question, which are to be framed keeping in mind the known benefits of the precast and the advantage of precast over cast-in-situ type of project. Their prospective of the precast and cast-in-situ observed until date.

#### Importance of precast technique in infrastructure projects.

In this, Question are based on a statement, which focuses on the peoples knowledge about the precast and do they practice it on site. Do they think precast is cost effectiveness over cast-in-situ, does it reduced time completion or not. Is materials are saved on adopting the precast, in the design build efficiency more compare to cast-in-situ or not. Environment resistant, low maintenance & repairs work, sound pollution and transportation take more time while executing work on construction site.

**VIII.DATA ANALYSIS/ QUESTIONNAIRE SURVEY**

The data are collected from the Google form, which were circulated across different social forms, person hand-to-hand, different offices and site. Then the collected data were stored into Google form and converted into excel sheet. About 100 number of respondents is taken to form and analysis the work. Over here it has been divided into two parts A Background data into which part 1 & 2 are created.

**Analyzing the General information of characteristic of the respondent from the survey project.**

**City:** From Survey response , It has been seen that 48% of the respondents were from Gandhinagar and 30% were from Ahmedabad city, rest from Bhavnagar about 8%, Surat 3%, Rajkot about 7%, and some of them were about 1% each from Visnagar, Waterloo, Mehsana, Jaipur, Nadiad, Ankleshwer respectively.

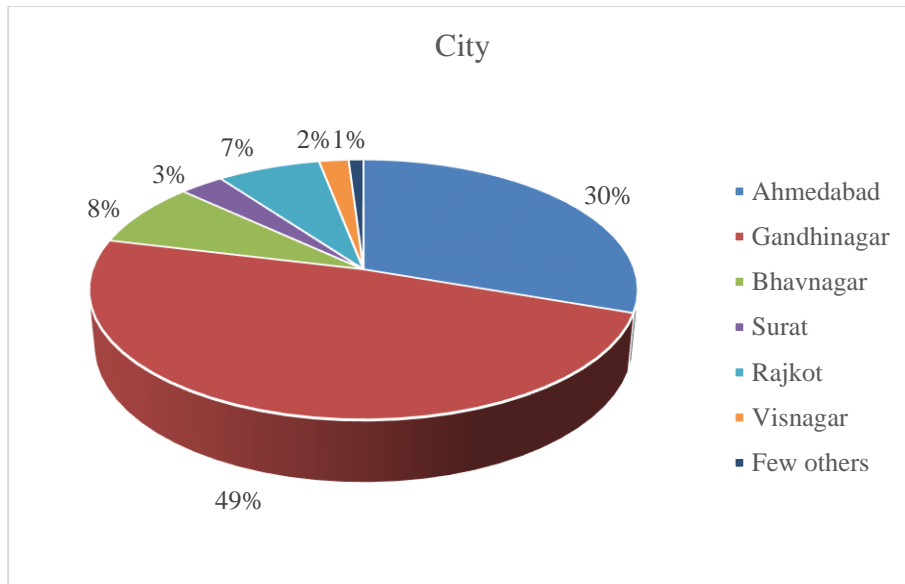


Figure 1 Respondents worked

**State:** It has been seen that nearly 97% of the respondents belongs to Gujarat state and rest from Rajasthan, West Bengal and Ontario sharing 1% each.

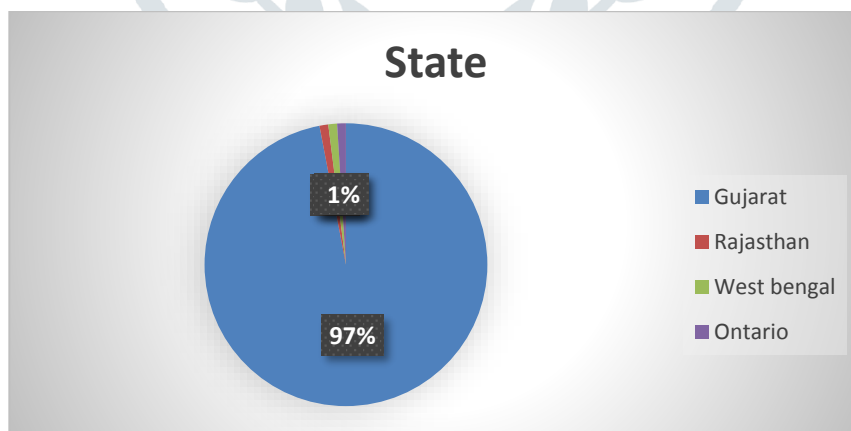


Figure 2 Respondent Native

**Designation:** This data shows majority of respondent are engineers and government employee so review given by more authenticate .From the survey it was seen that 40% of the people were Government Employee, Engineer/Consultant Engineer were about 35% and PSU, Builder, Contractor were 4%, 8%, 13% respectively.

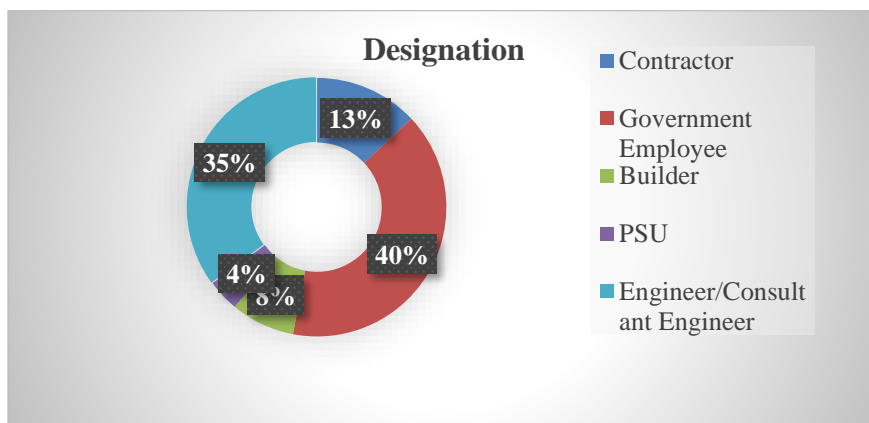


Figure 3 Designation of the respondents

**Work experience of the respondents:** It has been noticed that the people having 0-5 years of experience in the field where 58%, people with 5-10 years where 22%, 10-15 years were 9% and people with more than 15 years where 11% who filled the survey form.

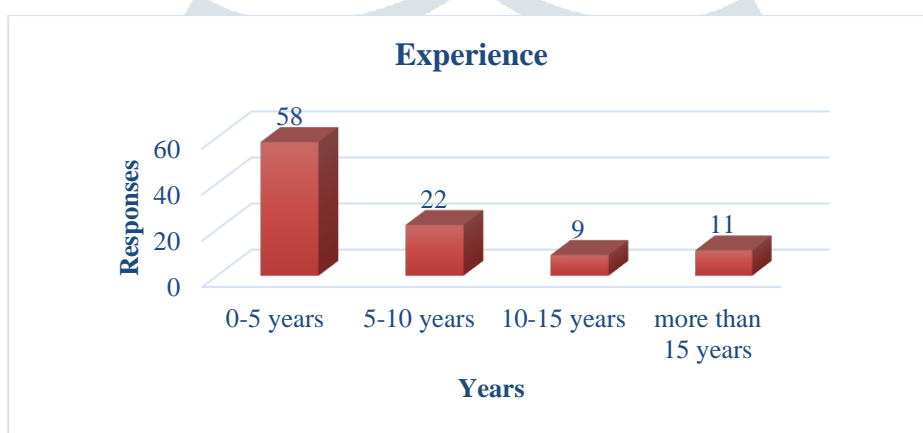


Figure 4 Work experience of the respondents

**Type of the project:** It has been seen that about 45 number of people have carried the work in roads, highway. In Bridges 9 number, 24 number of people have done the work in water supply resource, 4 number of people have completed the work in airport, mass transit and airways and 65 number of people have done the work in any other which can be residential and commercial building etc.

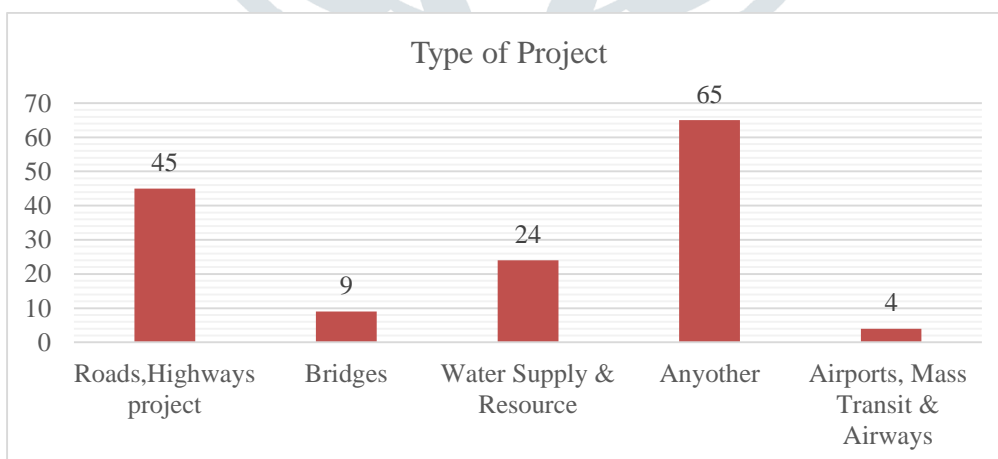


Figure 5 Type of Project

✓ **General Analyze of Important Factor in Construction project.**

**Planning and Licensing of the Project:** It is noticed that people are facing a major challenge approving their land from government and passing their property. This might affect the overall cost and time of construction project. Thus, contractor/builder increase the property’s cost to approve it incorrectly, hence it is directly affected to normal people who are buying it. The following table shows the design for the Likert scale method for Planning & licensing parameters.

**Table 4 Planning and Licensing Project**

Planning & Licensing Project	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total
	N.R	A.V	N.R	A.V	N.R	A.V	N.R	A.V	N.R	A.V	
<b>Planning</b>	1	-2	19	-1	29	0	37	1	14	2	44
<b>Approving project</b>	4	-2	20	-1	33	0	25	1	18	2	33
<b>Land Acquisition</b>	2	-2	6	-1	31	0	46	1	15	2	66
<b>Land Possession</b>	1	-2	16	-1	26	0	42	1	15	2	54
<b>Subsidy amount</b>	8	-2	22	-1	29	0	34	1	7	2	10

(N.R= Number of response gathered, AV= Attitudinal Scale)

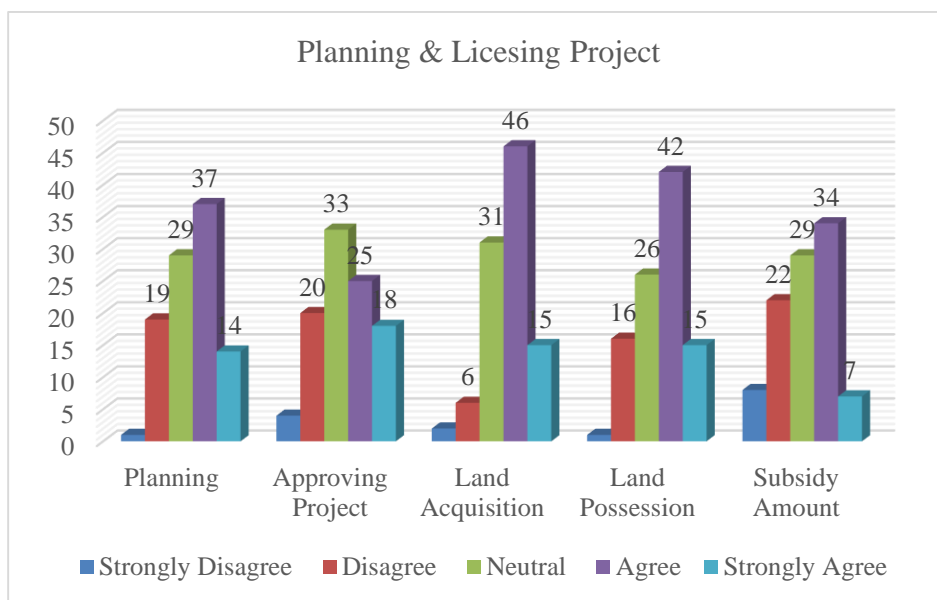


Figure 6 Planning and Licensing of the Project

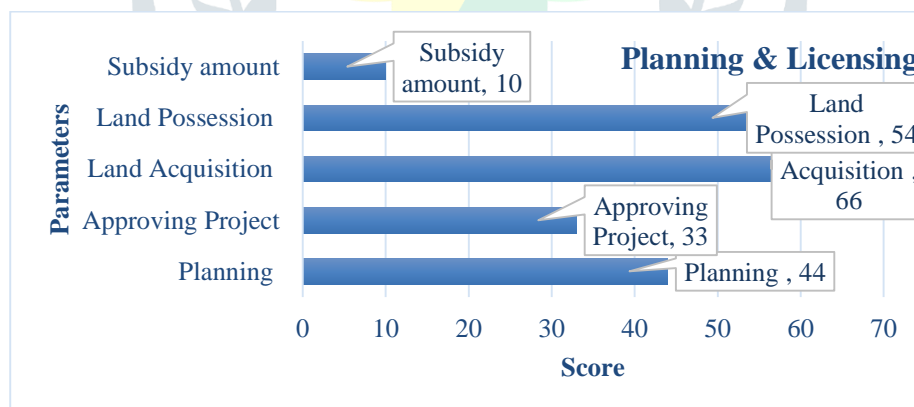


Figure 7 Planning and Licensing Project: Likert Scale

From the above table score we say that major problem of people are facing in land acquisition is having 66 score and land possession being 54 score. Least amount is Subsidy. It can be properly planned thus we need to find out the solution to overcome it.



**Materials & Machinery:** The following table shows the design for the Likert scale method for Materials & Machinery.

Table 5 Materials & Machinery

Materials & Machinery	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total
	N.R	A.V	N.R	A.V	N.R	A.V	N.R	A.V	N.R	A.V	
Handling	6	-2	13	-1	25	0	34	1	22	2	53
Storage of materials	7	-2	19	-1	21	0	42	1	11	2	31
Availability	0	-2	7	-1	14	0	53	1	26	2	98
Lower Cost	4	-2	15	-1	40	0	31	1	10	2	28

(N.R= Number of response gathered, AV= Attitudinal Scale)

Table 5 shows that people are facing a major issue in Availability of materials on site according to Likert scale method with 98 score being the highest on the top and Storage of materials being the third most important after Handling of materials on construction site. A chart of Likert scale in shows in above table.

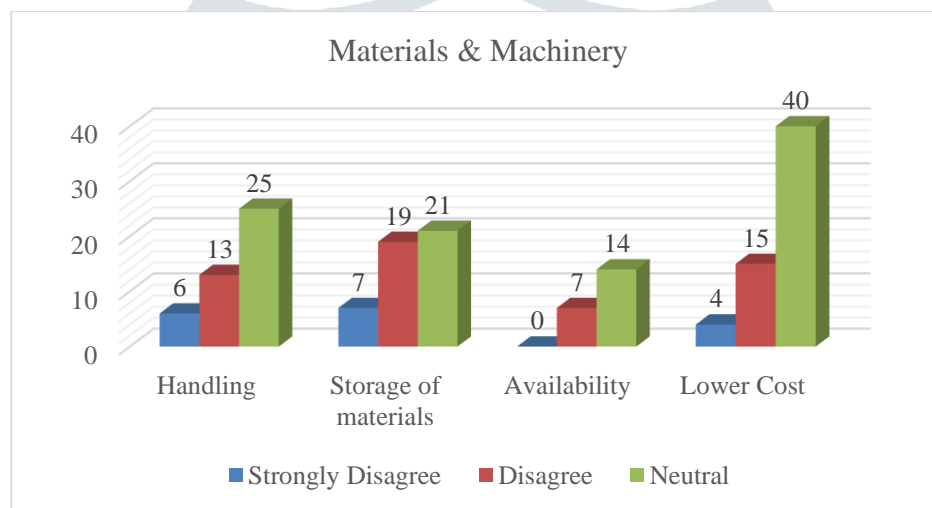


Figure 8 Materials & Machinery

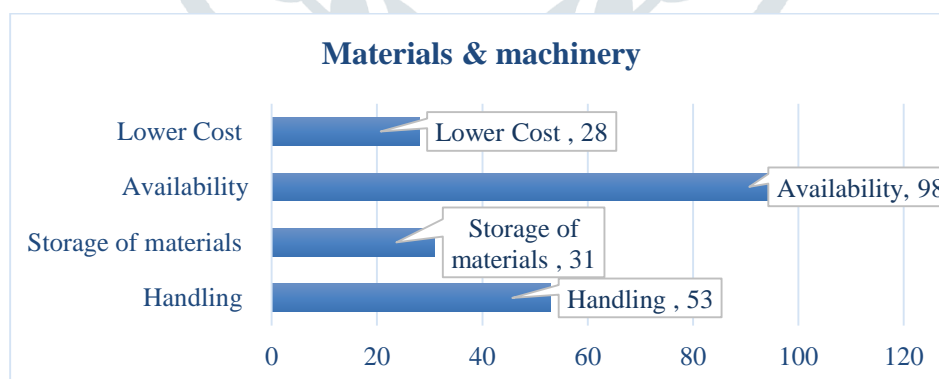


Figure 9 Materials & Machinery: Likert Scale

**Manpower:** The following table shows the design for the Likert scale method for Manpower.

Table 6 Manpower

Manpower	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total
	N.R	A.V	N.R	A.V	N.R	A.V	N.R	A.V	N.R	A.V	
Availability of manpower	5	-2	22	-1	21	0	29	1	23	2	43
Accommodation	4	-2	20	-1	33	0	28	1	15	2	30
Shifting the manpower	10	-2	15	-1	23	0	45	1	7	2	24

(N.R= Number of response gathered, AV= Attitudinal Scale)

From the above table it has been seen that the people are facing problem in handling the manpower on site. The availability of labor from site to site and accommodation of them. Once the job is done the shifting places an important role on the project, transferring manpower from one site to another. By using Likert scale we came to know that Availability of manpower score somewhat around 43 score from the data collected. Likert scale method charts is shown in above table.

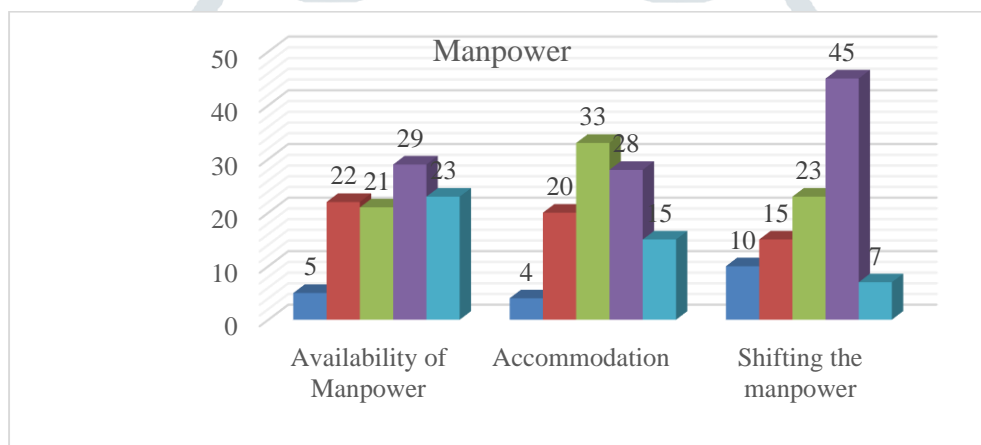


Figure 10 Manpower

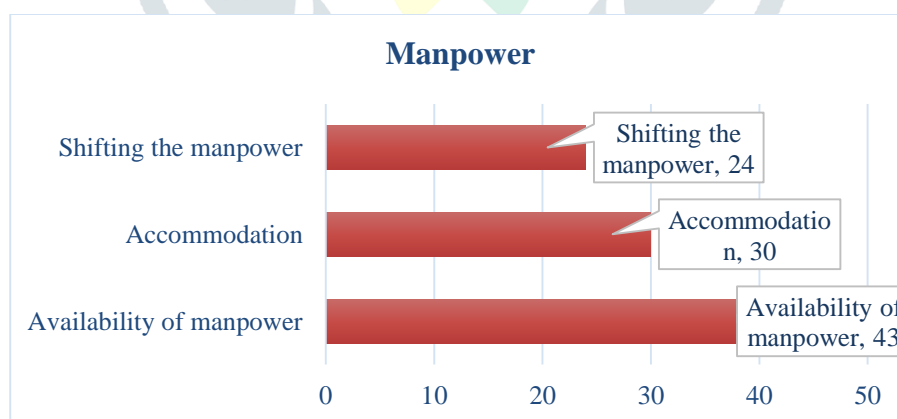


Figure 11 Manpower: Likert Scale



**Timely completion:** The following table shows the design for the Likert scale method for timely completion.

Table 7 Timely Completion

Timely Completion	Mostly delay		Delay		Neutral		On time		Ahead of time		Total
	N.R	A.V	N.R	A.V	N.R	A.V	N.R	A.V	N.R	A.V	
<b>Finish on time</b>	8	-2	20	-1	31	0	32	1	9	2	14
<b>Indian project are delayed</b>	15	-2	32	-1	27	0	16	1	-10	2	-26

(N.R= Number of response gathered, AV= Attitudinal Scale)

From the above table it has been seen that the people are completing the project work on or before duration by their company or the government. The Likert scale method shows that in India people most of the project are delay somewhat negative 26 score in it. Figure 12 shows the number of people completing the work on time and peoples response on delay in Indian project.

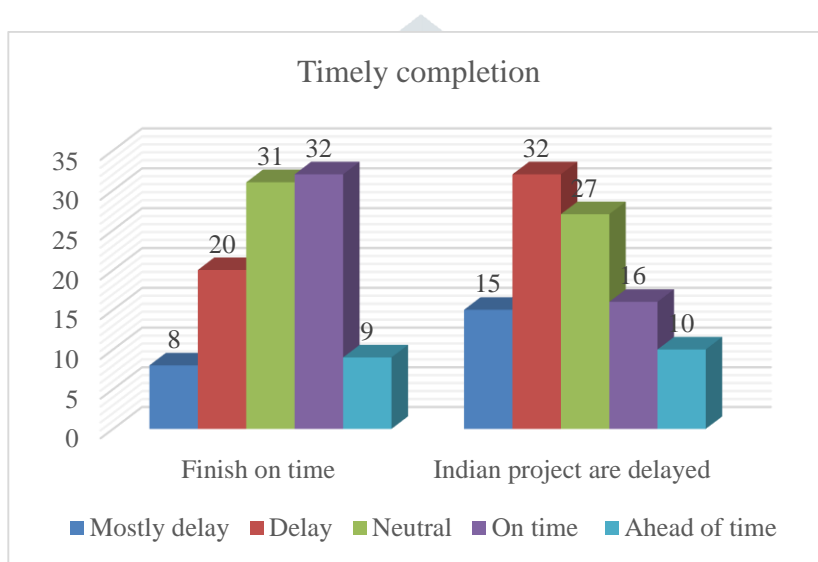


Figure 12 Timely completion

Above chart shows that out of 100 people 32 of them say that they finish their work within the time and in 32 of people think in India project gets delayed

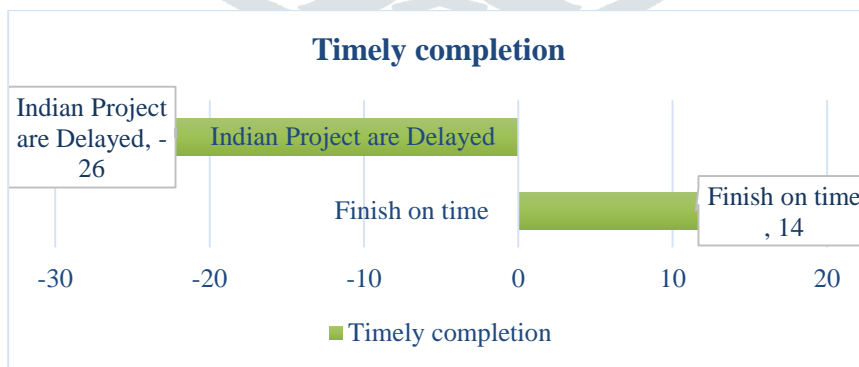


Figure 13 Timely completion: Likert Scale

**Cost overrun:** The following table shows the design for the Likert scale method

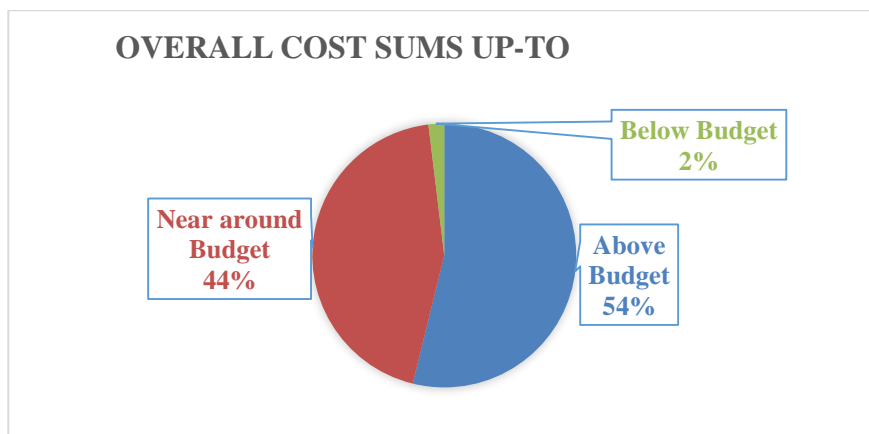


Figure 14 Cost overrun

From the above charts it has been seen that the overall cost of the project that sums up-to what extent of any company. It has been noticed from the survey that about 54% of the construction site is completed above the budget mentioned, only 2% of them finish the work below the budget.

**Difficulty due to executing project in/to public:** The following table shows the design for the Likert scale method for executing project into public.

Table 8 Difficulty due in executing project in/to public.

Executing in public	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total
	N.R	A.V	N.R	A.V	N.R	A.V	N.R	A.V	N.R	A.V	
Surrounding environment	2	-2	3	-1	39	0	42	1	14	2	63
Traffic Congestion	3	-2	6	-1	17	0	50	1	24	2	86

(N.R= Number of response gathered, AV= Attitudinal Scale)

From the above table it has been seen that the score of the people with the difficulty in executing the work on site. It has been seen that traffic Congestion is a major issue in the construction site which involve the nearby surrounding about 86 score while the construction work is carried out the nearby surrounding faces a major issue with 63 score on the scale. As shown in Figure 15. Thus, one should take precisely take care while executing construction work in city area by developing proper Panel for traffic hoarding and sign.

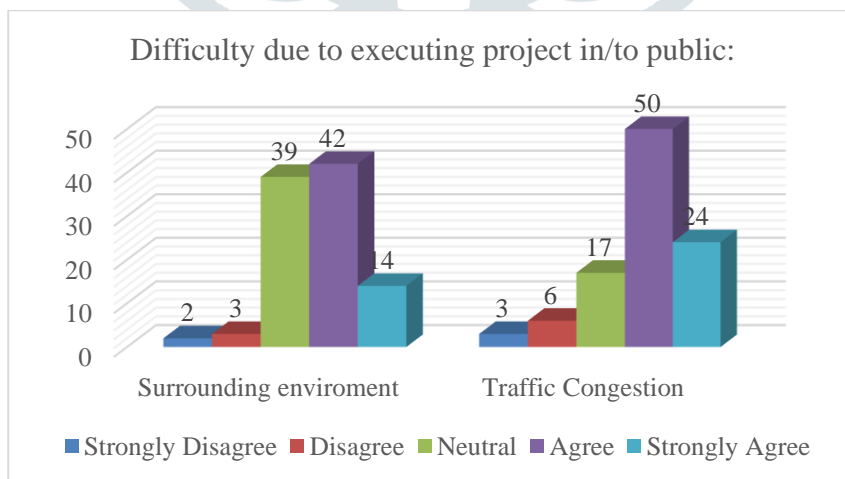


Figure 15 Difficulty due to executing project in/to public.

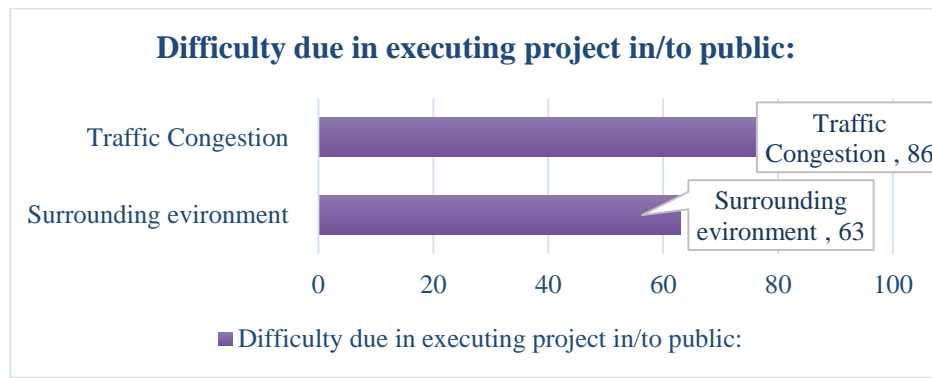


Figure 16 Difficulty due in executing project in/to public: Likert Scale

**Safety in Infrastructure:** The following pie chart shows the Primary precaution of Safety have been carried forward by people in Indian construction site project.

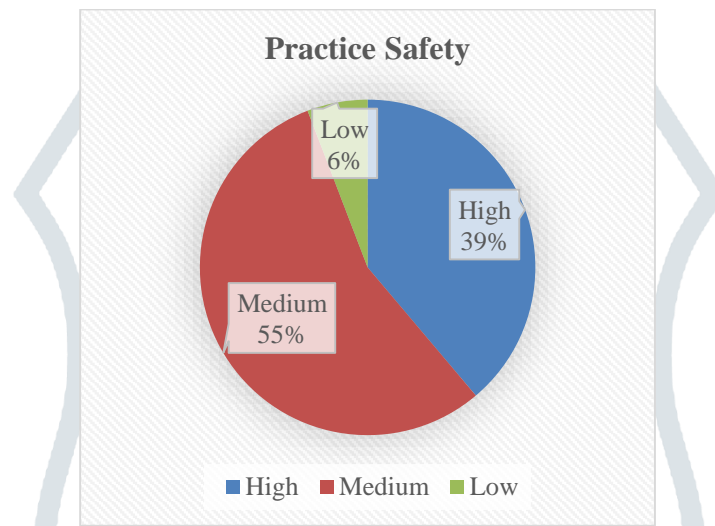


Figure 17 Safety in Infrastructure

From the above chart it has been seen that the number of respondents practicing the safety rules on construction site. About 55% of people shows interest in applying the rules and about 6% of them are not concern with the safety on site. Thus government, private organization and company should give more emphasis on safety aspect.

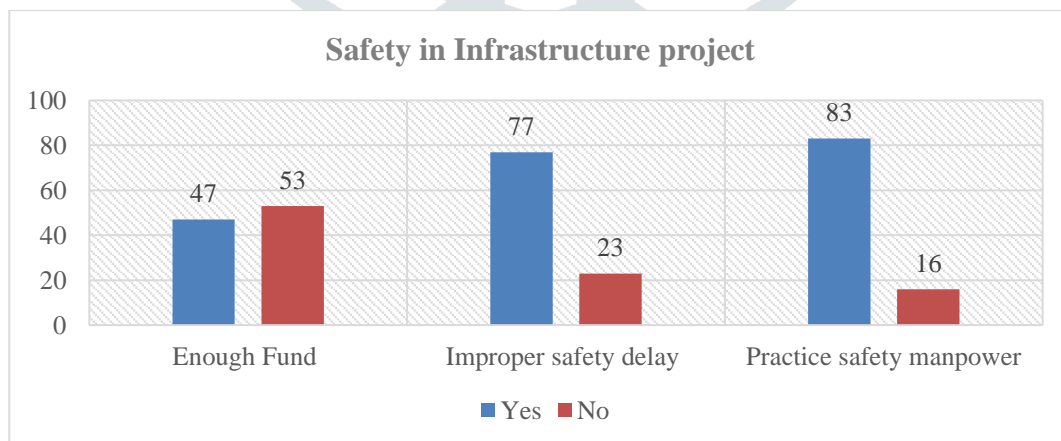


Figure 18 Safety in Infrastructure aspects

The above chart shows the total percentage of the funds provided by their company to practice safety is 47% and 77 % of the people saying improper safety may delay the construction time & 83% are practicing the safety for the manpower. Thus, one should try to focus safety in all the criteria in construction project

✓ **Analyses of Precast technique.**

Bar chart shows the people knowing about precast construction technique and no. of people practicing precast on construction site.

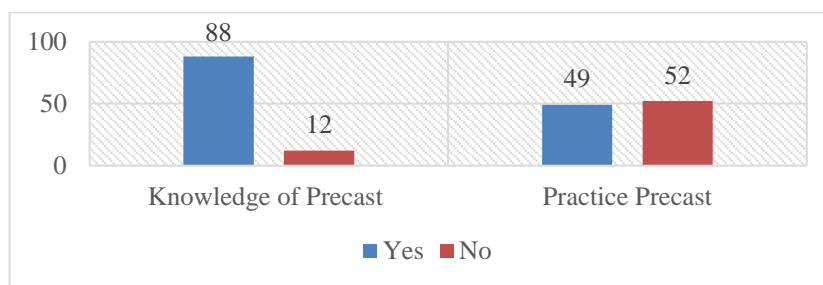


Figure 19 Importance of precast technique in Infrastructure Projects

The following table shows the data collected from the survey and with the help of Likert scale method for carrying out the importance of precast technique in infrastructure in construction projects.

Table 9 Importance of precast technique in Infrastructure Projects

Imp of precast	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total
	N.R	A.V	N.R	A.V	N.R	A.V	N.R	A.V	N.R	A.V	
<b>Cost effective</b>	5	-2	6	-1	41	0	32	1	16	2	48
<b>Time reduction</b>	2	-2	0	-1	16	0	43	1	39	2	117
<b>Materials saved</b>	3	-2	1	-1	25	0	36	1	35	2	92
<b>Design build efficiency</b>	1	-2	5	-1	21	0	47	1	26	2	92
<b>Environment resistant</b>	8	-2	5	-1	33	0	37	1	17	2	50
<b>Low maintenance</b>	1	-2	6	-1	37	0	29	1	27	2	75
<b>Sound pollution</b>	2	-2	7	-1	31	0	35	1	25	2	74
<b>Transportation</b>	9	-2	3	-1	27	0	42	1	17	2	55

(N.R= Number of response gathered, AV= Attitudinal Scale)

The number of people knowing the advantage of precast over cast-in-situ type of project. Likert Scale method shows that time reduction plays an important role in precast which scores 117, Materials, Design build efficiency score 92 , low maintenance & sound pollution scoring somewhat similar 75 and transportation and environment resistant scores somewhat similar 50. Thus it is seen that people know the advantage of precast over cast-in-situ type of project but not actually practicing the precast. People should adopt it and try to practice as and when needed.

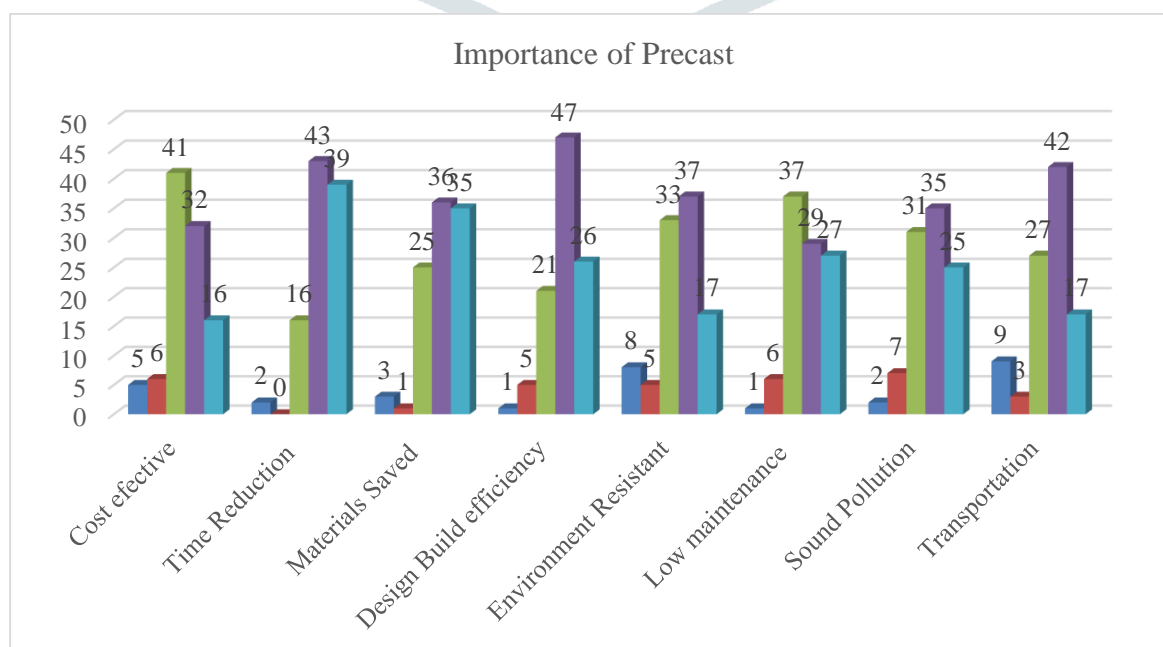


Figure 20 Importance of precast technique in Infrastructure Projects

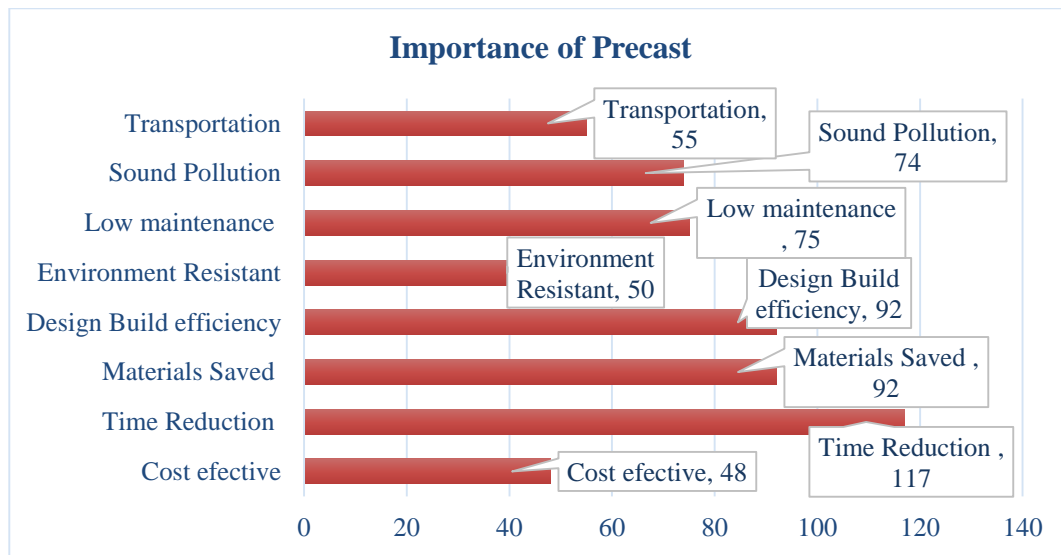


Figure 21 Importance of precast technique in Infrastructure Projects chart: Likert Scale

## CONCLUSION

From the above reviewed analysis, it has been seen that in the development of any nation, its infrastructure place has an important role. The contractor should emphasize more on skill development of labor, they should adopt an alternative technique for the big infrastructure project. Thus improving the quality of the work and saving in the time duration which is required in construction project which overall be cost-effective. The Precast construction method can be a solution for delay in construction industry, but to implement precast, it requires high initial funding and proper managing skills. Thereby, a person needs to study more about the precast and different technique while executing the project. From the Survey Conducted, it is seen that government has to improve the land acquisition, contractor should give proper skill to labor, and engineer should follow the safety measure while implementing any project on construction site.

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