

# IDENTIFICATION OF CRITICAL FACTORS AFFECTING INFRASTRUCTURE PROJECT PERFORMANCE IN INDIA

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**Abstract** - Infrastructure refers to structures, systems, and facilities serving the economy of a business, industry, country, city, town, or area, including the services and facilities necessary for its economy to function. Infrastructure project performance depends on various factors. Inefficiencies in Infrastructure implementation have substantial negative impact on India's economic growth. Thus this study aims at identifying and prioritizing the critical factors affecting the project performance. Most of the research articles discuss about the factors which affects the performance of Infrastructure project, however a very few articles reported about the performance parameters and the dependency of these parameters on various factors. This thesis work is an attempt to identify the critical factors affecting the performance of Infrastructure projects in India.

The general methodology of this study relies largely on the survey questionnaire which was collected from the local building contractors of different sizes by mail or by personnel meeting. A thorough literature review is initially conducted to identify the risk factors that affect the performance of construction industry as a whole. The survey questionnaire is designed to probe the cross sectional behavioral pattern of infrastructure projects.

**Key Words:** Infrastructure, Substantial, Economic Growth, Dependency, Behavioural.

## 1. INTRODUCTION

Infrastructure sector is a key driver for the Indian economy. The sector is highly responsible for propelling India's overall development and enjoys intense focus from Government for initiating policies that would ensure time-bound creation of world class infrastructure in the country. Infrastructure sector includes power, bridges, dams, roads and urban infrastructure development.

### 1.1 Objectives

The specific objectives are as follows:

- To identify the critical factors affecting infrastructure project performance in India.

- To identify and prioritize the performance parameters.
- To develop the dependency of performance parameters on various critical factors.
- To develop a framework based on factors identified.

### 1.2 Problem Definition

India's construction sector is expected to grow at 7-8% every year over the next decade after the new government. The country will see increased economic growth and the removal of barriers to foreign investment will 'spur demand for construction' over the coming 12-18 months.

The construction sector of India presently is worth US\$ 310 billion. As per the initiative of 'Make in India', the Indian government has undertaken a number of measures to ease access to funding for the sector as well as eased FDI regulations.

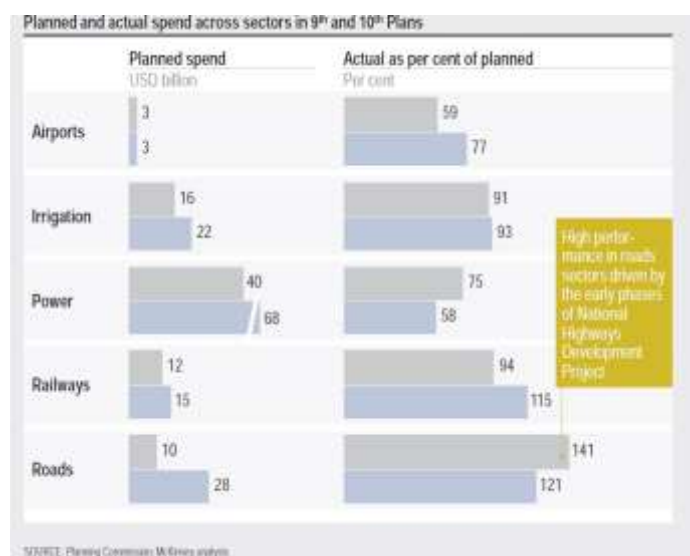


Fig.1- Planned and actual spend across sectors in 9<sup>th</sup> and 10<sup>th</sup> plans.

### 1.3 Scope of Work and Contribution

The scope of our study was based on Infrastructure sector of India. The factors which we have taken are taken keeping in mind the Indian construction industry; it may differ for other countries. Also, the survey samples size was 96, which can be increased to get more accurate results.

Inefficiencies in Infrastructure implementation have substantial negative impact on India’s economic growth. Eliminating these inefficiencies will require a common understanding and identification of the key bottlenecks that hampers infrastructure implementation during both pre-construction and construction phase.

As construction is a risky business and possibility of business failure always exists, companies have to consider the parameters that can have a direct effect to their success in business. So in this study critical factors leading to construction industry’s success/failure has been investigated.

### 2. LITERATURE REVIEW

The present review of literature is an effort to carefully examine and identify an exhaustive list of factors effecting performance of infrastructure projects Several articles were explored using keywords such as ‘infrastructure’, ‘success factors’, ‘project performance’ etc. A systematic review of the articles published in journals from databases such as ASCE JOURNALS, ASCE PROCEEDINGS, SCIENCE DIRECT, SAGE JOURNAL, PROQUEST, which are available in research institute library.



Fig.2- List of Journals Referred

### 3. METHODOLOGY

The research methodologies followed was reviewing the literature and then conducting a survey using questionnaire. The target population mainly included the professional who are already working in the construction industry and also the students who are currently pursuing the construction management courses and in near future who will be joining the construction firm in some managerial role. The data collected from questionnaire will be then be analyzed using Likert scale. The information obtained by this method will be further used to draw out necessary conclusion. Further to the factor analysis result, qualitative analysis is performed to identify major factors and prioritize performance parameters.

#### 3.1 Research Methods

The research methodology was divided in two parts. First, review of the literature was done, and secondly survey was conducted using questionnaire. The sampling design and questionnaire design was done for data collection and qualitative analysis was performed to conclude findings. From the literature review we found out various factors that were connected to the project performance of any Infrastructure project. We grouped these factors in 6 major heads namely,

1. Cost Performance factors
2. Schedule/Time Performance factors
3. Human related factors
4. Quality Performance factors
5. Safety Performance factors
6. Environmental factors.

#### 3.2 Questionnaire Design and Pilot Study

Questionnaire was divided into three sections. In first section, basic information of the respondent was inquired like respondent’s name, organization, designation, experience and area of expertise. The second section consisted of scaling the dependency of 6 factors on project performance of any infrastructure project. Then, in third section the respondent were asked to answer few questions under those 6 factors mentioned in the second section, to check their contribution in the project performance. These questions were formed on the basis of the literature review. These variables were measured on Likert scale given following below:

Rate from 1 to 5, which indicates,

1- Very Small    2- Small            3- Normal        4- Large  
5- Very Large

A pilot survey with the questionnaire in the previous phase and follow-up interviews with local contractors were conducted. The purpose was to identify the factors out of the 40 factors that applied overseas could also apply to the local construction industry. The small number interviews and the structure of the questionnaire in the pilot study does not allow for statistical analysis.

Responses to the interviews have been used to identify consistent themes, common practices, and insight provided by active and influential project participants that would provide additional guidance and assistance to the research team. The survey results formed the basis of modifying the questionnaire for the subsequent full-scale survey. The pilot study attempts to short-list locally relevant factors. The criteria for a short-listing are that the chosen factors are relevant in the local construction industry. As a result, only important and relevant factors were chosen for inclusion in the full-scale survey in the second phase of the research.

**4. RESULTS AND ANALYSIS**

In many companies the questionnaires were given, out of which some had an effective reply and some had satisfactory reply. Thus the response rate is 80%, which is considered a good response in this type of survey. All the questionnaire survey was done from project manager of the project or project engineer at the site. In some cases, consultant gave the answers on behalf of their clients, both from the owner and the contractor side.

**4.1 Ratings of Parameters**

The ratings of various types of parameters are shown below:-

Ratings of various parameters are dependent on the responses received from the industries. From the 96 respondents, 50% of them had more then 2 years of industry experience and out of which 18.8% of them had more than 10 years of industry exposure.

**Cost Performance Parameters Ratings:-**



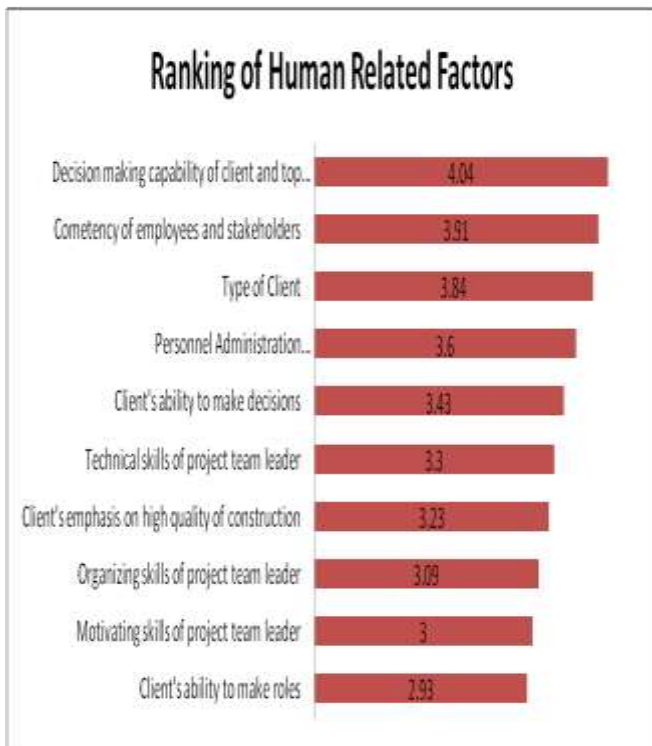
**Fig.3-** Bar Chart of Ranking of Cost Factors

**Schedule / Time Performance Parameters Rating:-**



**Fig.4-** Bar Chart of Ranking of Schedule / Time Performance Factors

**Human Related Parameters Rating :-**



**Fig.5-** Bar Chart of Ranking of Human Related Factors

**Safety Performance Parameters Rating:-**



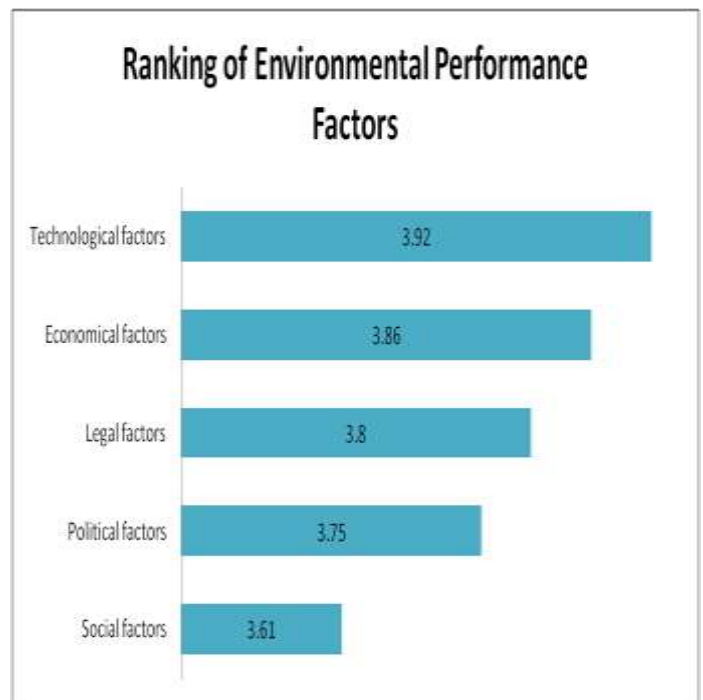
**Fig.7-** Bar Chart of Ranking of Safety Performance Factors

**Quality Performance Parameters Rating:-**



**Fig.6-** Bar Chart of Ranking of Quality Performance Factors

**Environmental Performance Parameters Rating:-**



**Fig.8-** Bar Chart of Ranking of Environmental Performance Factors

## 4.2 Analysis of Parameters

1. Cost performance has high impact on the overall performance of the infrastructure projects in India. Total 82.1% of respondents agree that the cost performance make high impact on the performance of infrastructure projects in India and 4.2% respondents believe that cost performance doesn't impact the performance.

2. Schedule/Time Performance is as important as cost performance and has a high impact on performance of Infrastructure projects in India. 86.3% respondents believe that schedule/time performance has high impact on performance of infrastructure projects in India and 11.6% respondents are on neutral side and 2.1% respondents believe that it doesn't impact the performance of the infrastructure projects in India.

3. Responses total 65.3% respondents believe that human related performance has high impact on performance of infrastructure projects in India and 28.4% respondents are neutral and 6.3% respondents believe that human related performance doesn't impact the performance of the infrastructure projects in India.

4. Overall 76.9% respondents believe that quality performance has high impact on the overall performance of the infrastructure projects in India. 21% respondents are neutral and 2.1% respondents believe that quality performance doesn't impact the performance of the infrastructure projects in India.

5. Total 71.5% respondents agree that safety performance has high impact on the performance of the infrastructure projects in India. 25.3% respondents are neutral. 3.2% respondents believe that safety performance doesn't impact the performance of the infrastructure projects in India.

6. 66.3% respondents believe that environmental performance has high impact on the performance of the Infrastructure projects in India. 22.1% respondents are neutral and 11.6% respondents believe that environmental performance doesn't impact the performance of the Infrastructure projects in India.

## 5. CONCLUSIONS

Overall conclusion of the work is that cost performance parameters and time/schedule performance parameters affects the performance of project to a large extent as compared to the human related, quality, safety, environmental performance parameters. It

does not mean that parameters other than cost and time does not effect the performance of project but they have less impact in comparison.

## 5.1 Limitations and Future Research Directions

This study was conducted on the basis of the available literature and includes articles which were found using the keywords such as 'Critical factors affecting Infrastructure projects', 'project performance' etc. Maximum responses were received from respondents, who are working in Infrastructure industry. These responses can be augmented in future research for coherent results and analysis. Moreover the study covers only Indian Construction industry specifically Infrastructure Sector, all together for analysis, and it can be further extended for sector specific.

Most of the research articles discuss about the factors which affects the performance of Infrastructure project, however a very few articles reported about the performance parameters and the dependency of these parameters on various factors. Hence future research may be focused on more number of responses, more performance parameters and can find out more factors which affect the Infrastructure projects.

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