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IMPACT OF CRITICAL FACTORS ON CONSTRUCTION PROJECT

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ABSTRACT

The local construction industry is facing insurmountable challenges, which caused deterioration day by day. Almost most projects in India face difficulties to achieve the desired results. Many causative factors affect on planning, scheduling, and execution stage during the project life. Many countries have researched, to find out what is the prime cause of delay and cost overrun. Many approaches were added with time to identify and mitigate the root cause of such addressed issue but no one get success to quantify it appropriately. This reason is highly varying viz country to country, region to region. So, need the study thoroughly the condition to mitigate the effect of factors and avoid them. The purpose of this research is to identify and evaluate the critical factors causing an impact on the construction industry. Through a questionnaire survey, total 110 numbers of questionnaires were distributed to the stakeholders like government and private contractors, supervisors, site engineers, and architecture, 62 critical factors causing were identified and divided into five categories. The survey data was analyzed using Cronbach's alpha for reliability check and utilizing the relative importance index (RII) for the ranking. The study found that the impact of the top ten ranking factors among 62 factors are (1) Late delivery and logistics of materials, (2) Continuous breakdown of

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machinery, (3) Lack of experience (Consultant related), (4) Lack of modern equipment, (5) Fluctuation of construction materials prices, (6) Waste generation, (7) Low salary for engineers and construction workers, (8) Lack of experience, (9) Poor site management and supervision, (10) Poor financial control and management. These findings of the study will help to improve the existing status of the construction industry and to be used as a variable in future prediction models and management.

KEYWORDS: Construction Management, Planning, Controlling, Critical Factors

1. INTRODUCTION

The government of India has projected very large investment requirements to meet specified infrastructure standards while also supporting the growth process. The construction business is generally split into three sections: Buildings (such as High rises, rowhouses, commercial, etc), infrastructure (such as roads and highways), and specialist structures. All enterprises normally involved in the creation of all types of structures, such as houses, office buildings, roads, and bridges, are rated in the construction sector. They have also identified the need for modern technologies to be introduced to accelerate and optimize the development of this infrastructure. Construction technology is worldwide having a good reputation for being one of the oldest industries. But somehow this good reputation is badly damaged with it being regarded as a highly unpredictable and unreliable industry when it comes to management. Almost all projects in India somehow face difficulties in achieving the desired results.

There are several studies on the Yemen construction industry, poor construction management with its counterparts is the most dominant and critical cause of construction failures in Yemen. Also, dominant factors of construction failure in Yemen are frequent changes of design, continuous suspension of work, shortage of raw materials, hiring of an uneducated contractor, low salary for engineers and construction workers, cash flow and financial difficulty, delay of a progress payment to subcontractors, the financial difficulty faced by owners and poor financial control and management (Yaser Gamil & Ismail Abdul Rahman 2018). While in Jordon, consultants accepted the critical failure factors are difficulties in finance faced by the contractor, insufficient scheduling and planning of the projects by the contractors, and inadequate technical study by the contractor during the bidding stage. The owner's responses to critical failure factors of the construction project are poor planning and scheduling of the project by the contractor, financing difficulties faced by the contractors, and improper technical

study by the contractor during the bidding stage. The contractor accepted the critical failure factors are financial difficulties faced by the contractor, poor planning and scheduling of the project by the contractors, and delays in contractors' payments to sub-contractors (M. Khlaifat, E. Alyagoub, Rateb J. Sweis & Ghaleb, 2017). The study by Malek Mishmish & Samesh, (2016) The designer needs enough time to solve design errors and reduce inconsistency in design documents while the client gets sufficient time to review the design thoroughly. It is reducing the variation during the construction stage. Enough time is allowed during the tendering phase for contractors to become more familiar with the project and to properly price the work. The selection of qualified contractors also reduces the potential claims. The selected contractors need to have enough skilled resources to carry out the works**).**

Whereas in the Moroccan construction industry, The most significant causes of project delay in the Moroccan construction industry are the delay of the progress payment, lack of training for employees, lack of waste management strategy, unrealistic contract duration imposed by clients, rework due to the construction errors, excessive subcontracting, delay in obtaining permits from governmental agencies, ineffective planning, and scheduling, lack of collecting planning and unskilled workforce (Mohamed Bajjou & Anas Chafi 2018). National downturns in the economy, high prices of building materials during construction, poor estimating, delayed progress payments from the client, and non-payment of interest on delayed certificates have been identified as the top five important financial causes of contracting firms' failure in Egypt (A.M. El-Kholy & A. Y. Akal 2019). In Ghanaian, The three most critical impacts of accidents and hazards in the GCI were identified as slow down of work, increase in the cost of the project and poor performance of work, the creation of fear in the construction workers, increased impairment in the construction workers, delivery of the nation and its GDP, profitability of the contractor and the cost of the project to the client (Dickson, Joshua, Adinyira & Amoah 2021). The skillfulness of the workers is directly proportional to the labor productivity and hence the success of the construction project (Ahmed, Islam, Ikramul & Mehrab, 2018). Failure to administer the contract has been the main cause of disputes. And both contract documentation and contract administration should be given proper attention to eliminating the main cause of disputes (Illankoon, W.Y. Tam, Khoa N. Le & Ranadewa, 2019). The main causes of design construction interface problems in Palestinian large building construction projects from consultant's & contractors' points of view are unstable client requirements, lack of proper coordination between various disciplines of the design team, awarding the contract at the

lowest price regardless of the quality of services, lack of skilled and experienced human resources in the design firms, lack of skilled human resources at the construction site, delaying of dues payments, lack of specialized quality control team, lack of professional construction management, delaying the approval of completed tasks and vague and deficient drawings and specifications (K.Z. Sha'ar, S.A. Assaf, Bambang, Banshil, 2016). Serve as general guidelines to varied stakeholders involved in the airport construction project to bolster the quality and success rate of future airport projects both in India and other developing countries (Vandana, Thomas Alex, Vaishnav, 2020).

Nevertheless, the discovery of critical factors in the Indian construction industry is based on the reading of literature papers and research conducted by us (2022) on the causative factors of Indian construction technology with a limited number of respondents, who discovered that the impact of most critical factors is gaps in the system to qualify the authenticity to stakeholders. As a result, this study employs a quantitative study technique to identify the issues confronting the Indian construction industry. In this research, the gap of investigative study on current concerns and elements of its regression and degradation.

2. DATA COLLECTION ANA ANALYSIS

2.1 RESPONDENT'S PROFILE

Respondents for this study are Indian construction stakeholders who are worked in the Indian construction industry. A total 110 numbers of questionnaires were distributed by online survey mode however 80 responses were returned by online mode. Another 30 numbers responses were filled from offline survey mode. Stakeholders in the Indian construction industry had worked as an engineer, contractors, architects, town planners, and valuers in India.

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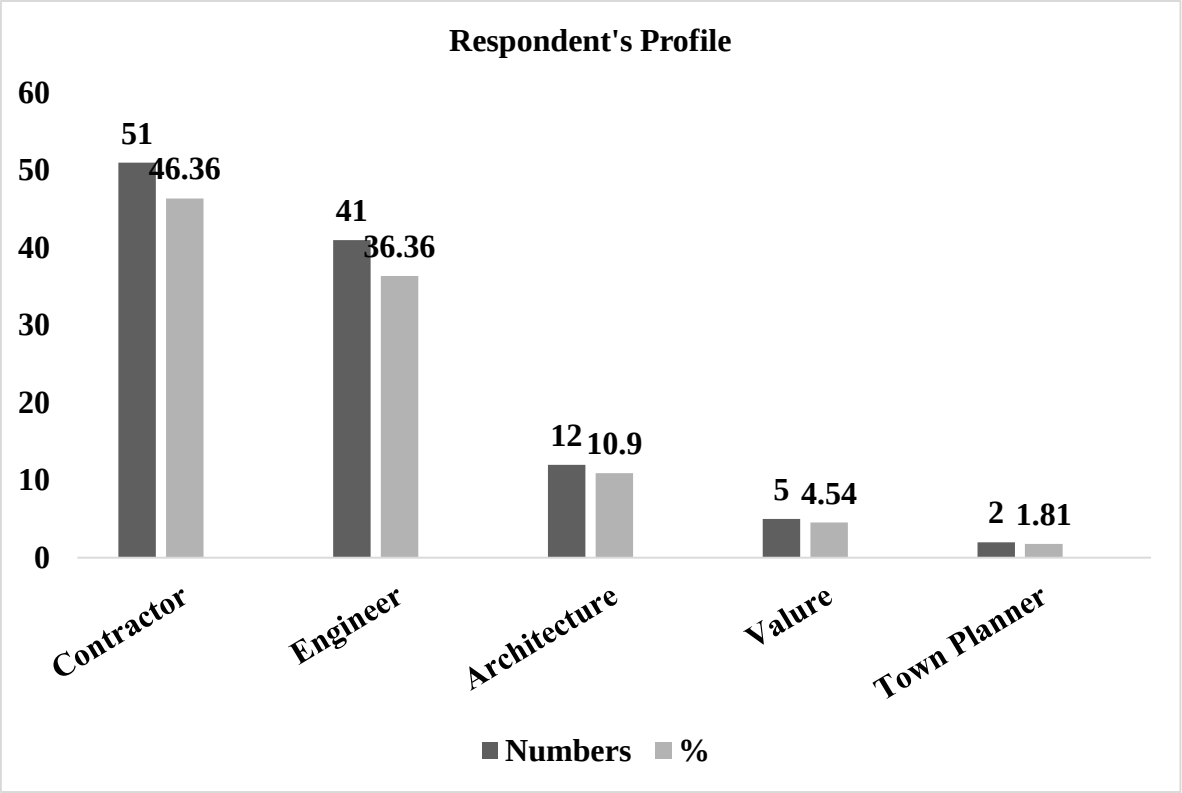

Figure 1 Respondent's Profile

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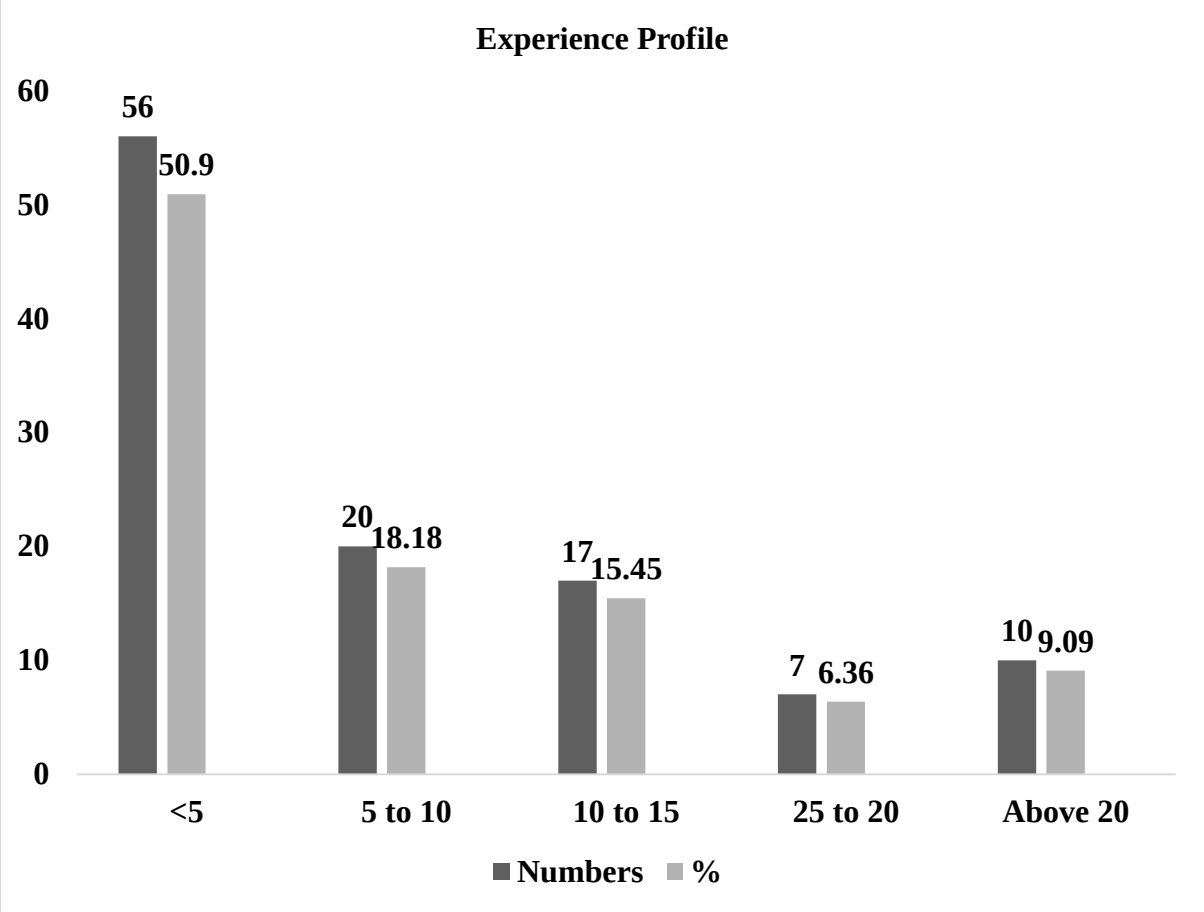

Figure 2 Respondent's Experience Profile

Figure (1) shows the questionnaire distribution of responses based on the response's designation. Out of a total of 110 respondents, 51(46.36%) numbers are contractors, 40(36.36%) numbers of engineers, 12(10.9%) numbers architecture, 5(4.54%) numbers the valuer, and 2(1.81%) numbers of town planners. Based on the respondent's experience profile figure (2) are show 56(50.9%) numbers of respondents are 0 to 5 years of experience, 20(18.18%) numbers respondents are in between 5 to 10 years of experience, 17(15.54%) numbers respondents are in between 10 to15 years experience, 7(6.36%) numbers of respondents are in between 15 to 25 years experienced and 10(9.09%) numbers of respondents are more than 25 years experienced.

Table (1) shows the detailed demographic profile of respondents. It is shown that the highest percentage of respondents is working in residential projects and private firms with a percentage of 76.36% respectively. In terms of the role of respondents, the highest percentage is contractors with 46.36%. Referring to their education level and the number of years of

experience in the construction industry, most of the respondents are Bachelor's holders and the highest groups of experience belong to the category of 0–5 years with 50.9% among other categories.

2.2 DATA ANALYSIS

Before the ranking was carried out to check the reliability and consistency of the data was of Cronbach's alpha method. The result of the Cronbach alpha value for the five Likert scales is α=0.84, which is Excellence consistency and the data is reliable and satisfied and consistent to be used for further analysis and investigations. After the Cronbach test, the data collected from the survey is analyzed for relative importance index (RII). The RII formula was adopted by Gamil and Rahman, 2018 as follows,

Table 1 Demographic Profile of Respondent's

Demographic Profile	Variable	Frequency	Percentage
Type of project	Residential	84	76.36
	Infrastructure	26	23.63
Category of project	Private	84	76.36
	Government	26	23.63
Role of participant	Project Manager	2	1.81
	Engineer	38	34.54
	Contractor	51	46.36
	Architecture	12	10.9
	Valuer	5	4.54
	Town Planner	2	1.81
Level of Education	Diploma	6	5.45
	Bachelor Degree	92	83.63
	Master Degree	12	10.9
Experiences	0-5	56	50.9
	5-10	20	18.18
	10-15	17	15.54
	15-25	7	6.36
	>25	10	9.09

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$$\text{RII}=\frac{\sum W}{A*N},\ \text{Where } (0 \leq \text{RII} \leq 1)$$

In which, W= represents the weight assigned for each factor by respondents from 1 to 5 (in this study, the range 1 is given for not significant and 5 for extremely significant); A= represents the maximum weight given (in this study 5); N= represents the total numbers of respondents for the study (Mayank 2022) and RII= relative importance index.

The higher value of the relative importance index of each factor is highly impacting and significant.

2.3 GOVERNMENTAL ADMINISTRATIVE FACTORS

Table (2) shows the factors which are related to government were listed and analyzed. It is showing the factors related to the government category of 16 causative factors with a statistical analysis of each factor.

Table 2 Governmental Administrative Factors

Factors	RII	Rank
High cost of construction and land	0.70	1
Corruptions	0.68	2
Sudden changes in projects scopes	0.67	3
Low budget allocation for the construction industry	0.66	4
Lack of coordination between construction parties	0.66	5
Lack of approved national systems	0.65	6
Poor transparency	0.61	7
Unstable national economy	0.61	8
Lack of stakeholders' accreditation system	0.59	9
Administrative weakness	0.58	10
Implementation of other country standards and codes	0.58	11
Lack of enforcement	0.57	12
Shortage of land ownership	0.56	13
Political unrest and national security	0.54	14

Long governmental bureaucracy	0.52	15
Political interference in the construction sector	0.52	16

2.4 MANAGEMENT AND LEADERSHIP FACTORS

Table (3) shows the factors which are related to management and leadership groups that were listed and analyzed. It is showing the factors related to management and leadership category of 17 causative factors with statistical analysis of each factor.

2.5 HUMAN RESOURCES RELATED FACTORS

Human resources are an important factor in the construction industry. Table (4) shows the 6 causing factors which are affected by construction technology.

Table 3 Management and Leadership Factors

Factors	**RII**	**Rank**
Poor site management and supervision	0.72	1
poor financial control and management	0.71	2
Poor management of cultural and social impacts	0.68	3
Poor human resources management	0.67	4
Ineffective handling of time overruns	0.67	5
Selection of incompetent contractors	0.67	6
Poor construction management	0.65	7
Inaccurate time and cost estimates and planning	0.64	8
Inefficient management of project mobilization	0.64	9
Ineffective handling of cost overrun	0.63	10
Unclear and vague contracts terms	0.62	11
Poor management of contract claims	0.61	12
Poor management of project information	0.61	13
Inefficient and ineffective quality control	0.60	14
Poor communication management	0.60	15
Lack of quality management systems	0.60	16
Poor conflict management	0.59	17

Table 4 Human Resources Related Factors

Factors	RII	Rank
Low salary for engineers and construction workers	0.73	1
Low labor productivity due to poor supervision	0.71	2
Lack of hiring systems and human resources firms	0.69	3
Immigration of skilled experts	0.68	4
Shortage of site workers and labor	0.66	5
Lack of experts, architects, and engineers	0.65	6

2.6 STAKEHOLDERS RELATED FACTORS

Table (5) shows the factors which are related to the stakeholders' group that was listed and analyzed. It is showing the factors related to the stakeholder's category of 17 causative factors which are related to construction sectors with a statistical analysis of each factor.

Table 5 Stakeholders Related Factors

Factors	RII	Rank
Lack of experience (Consultant related)	0.79	1
Lack of experience	0.73	2
Poor adherence to safety and health guidelines	0.71	3
Improper planning and estimation by the contractor	0.70	4
Lack of experience (Client related)	0.70	5
Excessive use of construction materials due to traditional design and method (Consultant related)	0.70	6
The demand for a high margin of profit	0.68	7
Cash flow and financial difficulty	0.68	8
Frequent change of design (Consultant related)	0.68	9
Delay of progress payment to subcontractors	0.67	10
Hiring uneducated contactor	0.66	11
A recurring mistake during construction	0.65	12
Continuous suspension of work	0.64	13

Mistakes and errors in design (Consultant related)	0.64	14
Financial difficulty faced by owner (Client related)	0.63	15
Lack of mutual trust with other parties (Client related)	0.63	16
Lack of consultancy firms (Consultant related)	0.59	17

2.7 CONSTRUCTION MATERIALS AND MACHINERY RELATED FACTORS

Construction material is a crucial problem faced by the Indian construction industry, India faced challenges with the late delivery of material and continues to increase raw material prices in construction material. Table (6) shows 6 related factors to construction material and machinery.

Table 6 Construction Materials and Machinery Related Factors

Factors	**RII**	**Rank**
Late delivery and logistics of materials	0.80	1
Continuous breakdown of machinery	0.79	2
Lack of modern equipment	0.78	3
Fluctuation of construction materials prices	0.77	4
Waste generation	0.76	5
Shortage of raw materials	0.70	6

3 RESULT AND DISCUSSION

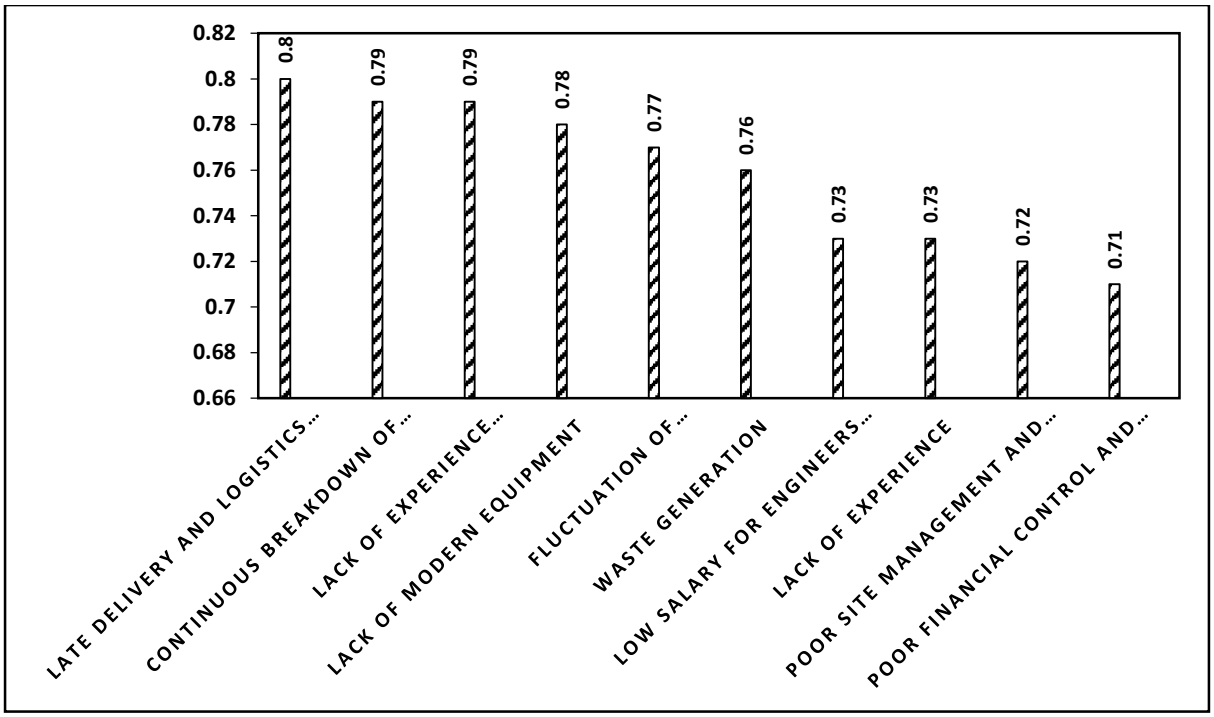

Figure 3 Impact of Most Causative Factors

The impact of most top 10 ranking for all 62 causative factors in all the groups are shown in Figure (3). The main purpose of identifying the impact is to the study and conclusion and recommendations. In Figure (1), The first paramount factors are late delivery and logistics of materials which have 0.80 of RII. Late delivery and logistics of materials in the Indian construction industry as the most causing factor according to the respondent's opinions. The second-ranked factors are a continuous breakdown of machinery having 0.79 RII.

Continuous breakdown of machinery affects the progress of work along the overall project cycle. The third factors are lack of experience of the consultant which has 0.79 RII. The fourth factors are lack of modern equipment which has 0.478 of RII. In Indian construction technology shortage of modern equipment is the most affected factor and it is the biggest reason for cost overruns and time overruns. The fifth factors are fluctuation of construction materials prices which has 0.77 RII. The highly increasing price of raw materials in India is the biggest failure factor and it is the biggest reason for cost overrun. The six factors are the waste generation with 0.76 RBI. The seven factors are the low salary of engineers and contractors of 0.73 RII. In Indian construction, industry-low salaries of engineers and contractors are the biggest issues and failure factors. The eight factors are lack of experience with 0.73 RBI. The ninth factors

are poor site management and supervision of 0.72 RII. The tenth factors are poor financial control and management with 0.71 RBI.

4 CONCLUSION

These research findings from a questionnaire survey conducted among stakeholders that there are 62 causative factors in the Indian construction industry. These factors are further classified into five groups. According to expert judgments and statistical research, each group has numerous linked elements rated from most important to least essential. This study also concluded the impact of most causative factors in the construction industry in India are (1) Late delivery and logistics of materials, (2) Continuous breakdown of machinery, (3) Lack of experience (Consultant related), (4) Lack of modern equipment, (5) Fluctuation of construction materials prices, (6) Waste generation, (7) Low salary for engineers and construction workers, (8) Lack of experience, (9) Poor site management and supervision, (10) Poor financial control and management.

The research work is limited to construction projects in the Urban area of the Surat Region only. The questionaries survey data is taken only from contractors, supervisors, engineers, and architects. This study is based on a questionnaire survey and from the analyses, purpose statistical methods are used. A total of 62 factors are divided into 5 groups. Cronbach's alpha method will use for a reliability check. RII method will use for the ranking of factors.

5 RECOMMENDATION

The continuous investigation is needed to be in detail in each group to facilitate the proposal of results. Compare the Indian construction industry with other successful construction industries for further research. Comparison of another analysis method for the desired solution. Region vice study is recommended for a better solution.

REFERENCES

1. *[1] Yaser Gamil & Ismail Abdul Rahman (2018): Assessment of critical factors contributing to construction failure in Yemen, International Journal of Construction Management, DOI: 10.1080/15623599.2018.1484866*
2. *[2] Dual M. Khlaifat, Reem E. Alyagoub, Rateb J. Sweis & Ghaleb J. Sweis (2017): Factors leading to construction projects' failure in Jordon, International Journal of Construction Management, DOI: 10.1080/15623599.2017.1382092*
3. *[3] Malek Mishmish & Sameh M. El-Sayegh (2016): Causes of claims in road construction projects in the UAE, International Journal of Construction Management, DOI: 10.1080/15623599.2016.1230959*

4. *[4] Mohamed Saad Bajjou & Anas Chafi (2018): Empirical study of schedule delay in Moroccan construction projects. International Journal of Construction Management, DOI: 10.1080/15623599.2018.1484859*
5. *[5] A. M. El-Kholy & A. Y. Akal (2019): Determining the stationary financial cause of contracting firms failure, International Journal of Construction Management, DOI: 10.1080/15623599.2019.1584836*
6. *[6] Dickson Osei-Asibey, Joshua Ayarkwa, Alex Acheampong, Emmanuel Adinyira & Peter Amoah (2021): Impacts of accidents and hazards on the Ghanaian construction industry, International Journal of Construction Management, DOI: 10.1080/15623599.2021.1920161*
7. *[7] Shakil Ahmed, Hamidul Islam, Ikramul Hoque & Mehrab Hossain (2018): Reality check against skilled worker parameters and parameters failure effect on the construction industry for Bangladesh, International Journal of Construction Management, DOI: 10.1080/15623599.2018.1487158*
8. *[8] I. M. C. S. Illankoon, Vivian W. Y. Tam, Khoa N. Le & K. A. T. O. Ranadewa (2019): Causes of disputes, factors affecting dispute resolution and effective alternative dispute resolution for Sri Lankan construction industry, International Journal of Construction Management, DOI: 10.1080/15623599.2019.1616415*
9. *[9] K.Z. Sha'ar, S.A. Assaf, T. Bambang, M. Babsail & A.M. Abd El Fattah (2016): Design–construction interface problems in large building construction projects, International Journal of Construction Management, DOI: 10.1080/15623599.2016.1187248*
10. *[10] Vandana Bhavsar, Shaun Thomas Alex, Vaishnav P. K., Abraham Jose, Nevin George Koshy & Shubham Atiwadkar (2020): Investigation of critical factors influencing the construction of airports: the case of India, International Journal of Construction Management, DOI: 10.1080/15623599.2020.1831220*