

Critical Factors Which are Affecting the Success of Construction Project in Gwalior Division , India''

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Abstract

The study of project success and critical factors of the project are considered to be mean to improve the effectiveness of project success. This examination plans to distinguish CFs in term of different project participants and their goals with regards to construction industries of Gwalior division in India and help to fix the construction project problems. To accomplish this target, 40 CFs were first distinguished and characterized into five classes' viz. Project management, Client related issues, Cost factors, Time factors and Environment related factors. A literature survey is conducted which give the most critical factors in the construction industry. Analytic hierarchy process (AHP) and Importance index (IMPI) methods are used to provide the relative significance of these factors. The result of this study may serve as a tool in the construction industry to rapidly assess the possibility of achieving project success.

Keywords: Critical factors, Project management, construction industry, Gwalior division, Project, Success.

INTRODUCTION

The construction industry is dynamic in nature due to the increasing uncertainties in technology budgets, and development process. Nowadays, construction projects are winding up considerably more complicated and troublesome. The undertaking group is facing uncommon changes. The investigation of project achievement and the critical factors are thought to be a way to enhance the adequacy of an undertaking. However, the idea of project success achievement has remained approximately characterized in the brain of the development experts. Different attempts were made by various specialists to decide critical factors in development. Various factors impacting project achievement have been proposed. A few factors are basic to in excess of one rundown, yet there is no broad concession to the factors.

Tuman (1986) defined project success as "having everything turned out as hoped to anticipate all project requirements and to have sufficient resources to meet needs in a timely manner." **Pinto and Pinto (1991)** noted that the key difference between the two is that the second definition incorporates the "perception of satisfaction as a success measure." Success on a project means that certain expectations for a given participant were met, whether an owner, planner, engineer, contractor or operator. However, these expectations may be different for each participant (**Sanvido, V. et al. 1992**) and the study of project success and

critical success factors (CSFs) is often considered as one of the vital ways to improve the effectiveness of project delivery (**Chan et al.,2004**). By identifying critical factors Project Managers would have a clear understanding of which aspects of projects might be critical for their successful completion. For a project to be successful, it is necessary to understand the project requirements right from the start and go for project planning, which provides the right direction to the project managers and their teams to execute the project perfectly. A successful project is one that is delivered on time and managed within the budget, quality, cost and time have been recognized as "triple constraint" or important factors of a successful project(**T. Anoop dec-2016**).

This Project analyses the critical factors and figures out which factor is more responsible for an effective completion of construction. This will give organization engaged with the construction industry with the establishment on which such systems can be produced later on. This study focus around the building construction projects in Gwalior division, India.

OBJECTIVE AND SCOPE

The research work reported in this paper is part of on-going projects under Gwalior division in India. The main objectives this paper is:-

- To investigate the main critical factors of construction projects.
- To distinguish the factors which are affecting the success of construction projects.
- To find out the relative importance of the factors affecting success.
- Develop a strategic model for the improvement and strengthening of construction method.
- To find out the most critical factors for providing success in construction projects in Gwalior division India.

SOURCE OF CRITICAL FACTORS

For discovering out the most critical factors in the construction projects, a literature survey is lead in which many works of the researchers have been analyzed and the critical factors are chosen which was common in most of the research. Total 5 main factor group and 35 sub- factors are taken by literature study and these factors are classified into five categories as shown in Table. 3.1.

Table 3.1: List of critical factors which are affecting the success of construction project.

Sr. no.	Group	Factors
1.	Project Management	Planning effort
		Site management
		Improper communication
		Decision making effectiveness
		Construction method
		Project monitoring
		Client satisfaction
2.	Cost related factors	Liquidity of organisation
		Cash flow of project
		Project design cost
		Cost of rework
		Cost of variation orders
		Escalation of material prices
		Waste rate of materials
3.	Client related factors	Client confidence in construction team
		Client emphasis of low construction cost
		Client emphasis on high quality of construction
		Client emphasis of quick construction
		Client ability to make decision
		Client experience
		Dispute between client and construction team
4.	Time related factors	Site preparation time
		Time need to implement variation orders
		Average delay in claim approval
		Unavailability of resources
		Planned time for construction
		Average delay in payment from owner to contractor
		Average delay because closure leading to material shortage
5.	Environment related factors	Air quality
		Noise level
		Waste around the site
		Climate conditions
		Earth quack possibility
		Availability of water
Nature of soil		

Table 3.1 will be used for analyzing the data to find out the relative importance of the factors by AHP & IMPI.

Project participant is the legal entity that participates in a project and takes over all respective task and responsibility

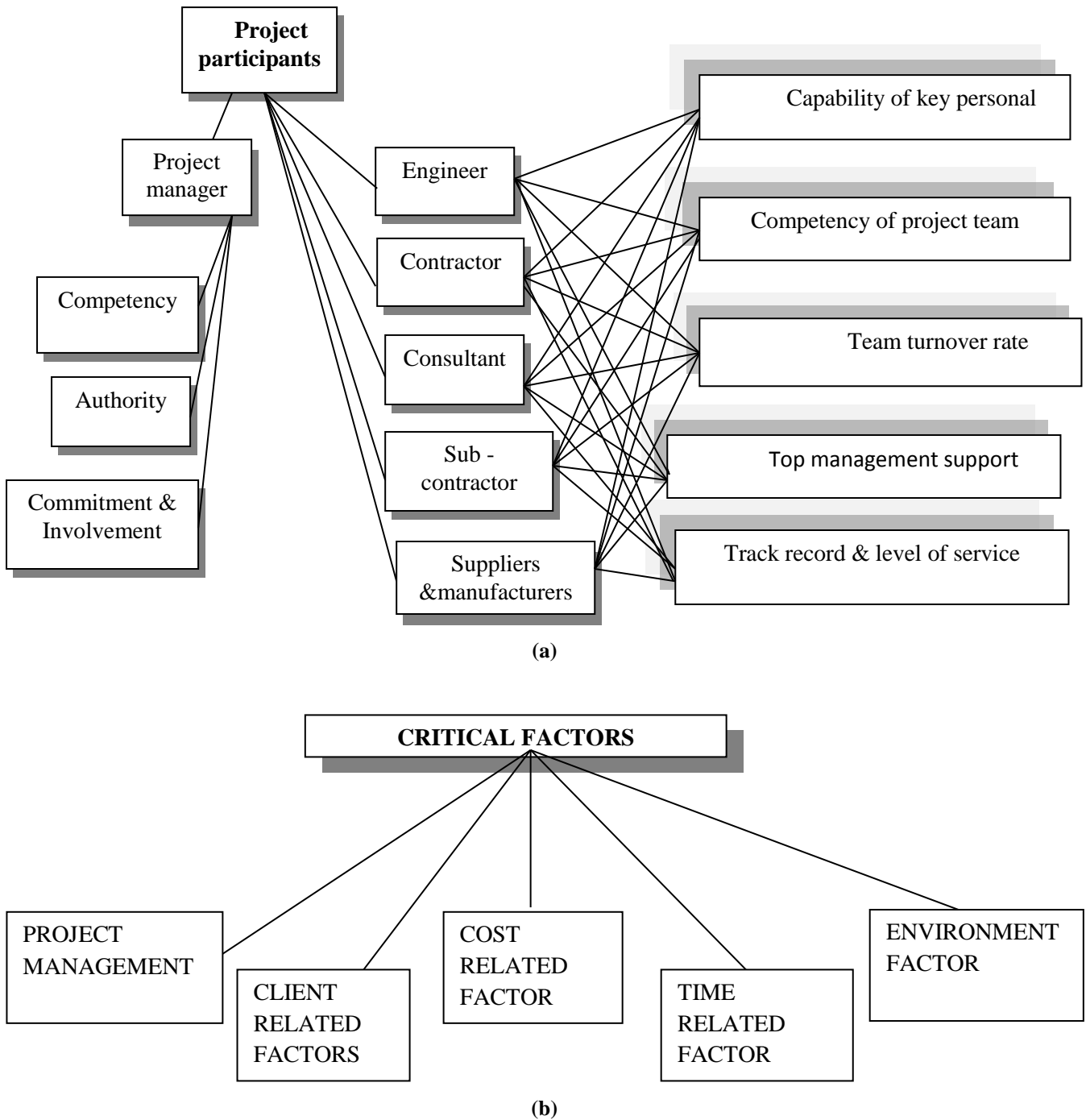


Figure 3.1: Sub hierarchy for:(a) Project participants; (b) Critical factors

RESEARCH METHODOLOGY

For connecting the objective of this paper two methodologies are utilized; initial one is Analytic hierarchy process (AHP) which is used to ascertain the relative importance of the main group. Furthermore, the co-factors under each gathering. While the other approach utilized is Importance index (IMPI) which is utilized to discover the relative importance of all the factors.

Analytical Hierarchy Process (AHP)

AHP is the Analytical hierarchy process to collect(structured) technique for sorting out (well order) for troublesome or complex decision. It was produced by **ThomasL. Saaty in 1970**. AHP incorporate displaying the task, its valuation, its weight and after that its investigation.

By the utilization of AHP, the relative significance of each factor can discover which will help in positioning these elements. Before beginning the procedure a model for the investigation must be prepared which comprise the main

critical factors as the first category and other comprises of subcategories.

How to use AHP

- (1) Decompose the problem into a hierarchy
- (2) Make pair wise comparisons and establish priorities among the elements in the hierarchy
- (3) Synthesise judgments (to obtain the set of overall or weight average for achieving goal.
- (4) Evaluate and check the consistency of judgements

The basic procedure is as follows:

- (1) Develop the rating for each decision alternative for each criterion by
 - Developing a pair wise comparison matrix for each criterion
 - Normalizing the result matrix
 - Average the value in each row to get the corresponding rating
 - Calculating and checking the consistency ratio.
- (2) Develop the weight average for the criteria by
 - Developing a pair wise comparison matrix for each criterion
 - Normalizing the resulting matrix
 - Averaging the values in each row to get the corresponding rating
 - Calculating and checking the consistency ratio
- (3) Calculate the weighted average rating for each decision alternative. Choose the with the highest score.

Consistency analysis:-

The purpose for doing this is to make sure that the original preference rating were consistent

There are three steps to arrive at the consistency ratio:-

- Calculate the consistency measure
 - Calculate the consistency index (CI)
 - Calculate the consistency ratio (CI/RI where RI is a random index)
- $$[CI = \frac{\lambda_{max} - n}{n - 1}]$$

Data analysis by AHP

AHP is used to determine the relative importance of the main group and the co-factors corresponding to the particular group.

Table 4.1: Main Group comparison & Ranking.

Main Group categories	Weight	Rank
Project management	0.498	1 st
Cost related	0.108	3 rd
Client related	0.262	2 nd
Time related	0.104	4 th
Environment related	0.034	5 th

The relative importance, comparison and ranking of the main group is shown in table 4.1 and fig. 4.1.

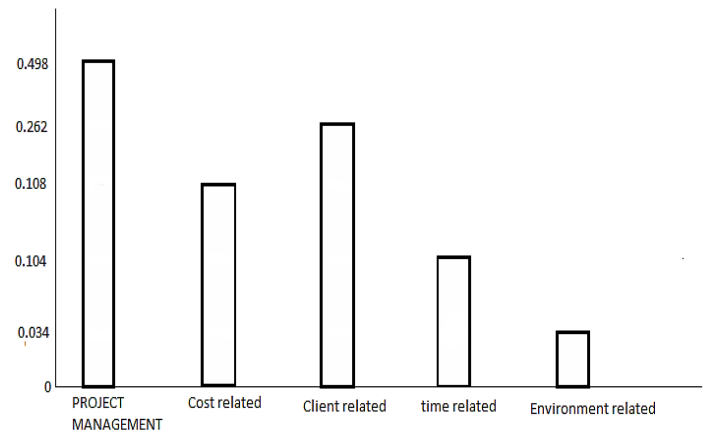


Figure 4.1: Comparison of main groups

Table 4.2: Ranking of Project management group factors.

Project management related factors	Weight	Rank
Planning effort	0.13	3 rd
Site management	0.08	5 th
Improper communication	0.05	7 th
Decision making effectiveness	0.32	1 st
Construction method	0.14	4 th
Project monitoring	0.07	6 th
Client satisfaction	0.19	2 nd

Table 4.3: Ranking of Cost related factors.

Cost related factors	Weight	Rank
Liquidity of organisation	0.08	5 th
Cash flow of project	0.05	6 th
Project design cost	0.04	7 th
Cost of rework	0.21	3 rd
Cost of variation orders	0.14	4 th
Escalation of material prices	0.21	2 nd
Waste rate of materials	0.25	1 st

The relative importance & ranking of the factors comes under the influence of cost related is shown in Table 4.3.

Table 4.4: Ranking of client related factors.

Client related factors	Weight	Rank
Client confidence in construction team	0.06	5 th
Client emphasis on low construction cost	0.3	1 st
Client emphasis on high quality of construction	0.28	2 nd
Client emphasis of quick construction	0.18	3 rd
Client ability to make decision	0.07	4 th
Client experience	0.05	6 th
Dispute between client and construction team	0.03	7 th

The relative importance & ranking of the factors comes under the influence of client related factors is shown in table 4.4.

Table 4.5: Ranking of time related factors.

Time related factors	Weight	Rank
Site preparation time	0.205	2 nd
Time need to implement variation orders	0.065	5 th
Average delay in claim approval	0.027	7 th
Unavailability of resources	0.33	1 st
Planned time for construction	0.045	6 th
Average delay in payment from owner To contractor	0.191	4 th
Average delay because closure leading to Material shortage.	0.134	3 rd

The relative importance & ranking of the factors comes under the influence of third party & human behaviour is shown in table 4.5.

Table 4.6: Ranking of Environment related factors.

Environment related factors	Weight	Rank
Air quality	0.16	2 nd
Noise level	0.09	4 th
Wastage around the site	0.2	7 th
Climate conditions	0.11	3 rd
Earth quake possibility	0.03	6 th
Availability of water	0.33	1 st
Nature of soil	0.05	5 th

The relative importance & ranking of the factors comes under the influence of environment related factors is shown in table 4.6.

IMPI (Importance index)

The data accumulated to choose the most critical factors in construction projects through a review by explorative surveys to the respondent required in day by day exercises of construction industries in Gwalior division in India. As the consequence of this stage, 35 critical factors is discovered. These factors were sort in 5 fundamental groups. In this method importance Index (IMPI) is figured as a part of frequency and survey.

How to use IMPI

(1) Calculate the frequency index

$$F.I = \sum w \frac{n}{N} \times \frac{100}{no.of\ scaling}$$

(2) Calculate the severity index

$$S.I = \sum w \frac{n}{N} \times \frac{100}{no.of\ scaling}$$

Where, for 1 & 2

W = total number of responses on every scale

n = Number of respondents

N = Total factors × number of respondents

(3) Calculate the IMPI

$$IMPI = \frac{F.I\% \times S.I\%}{100}$$

Data analysis by IMPI.

Because of the limitations of Random Consistency Index (RI), it is difficult to calculate the relative significance of all the 30 factors by AHP. Hence in order to overcome this difficulty Importance index (IMPI) process is used to find the relative importance index and rank them. The Overall ranking and index is giving below in Table 5.7

Table 4.7: Over all ranking of the Factors.

Total factors	Weight (In %)	Overall rank
Planning efforts	55.01	10 th
Site management	59.80	7 th
Improper communication	37.24	26 th
Decision making effectiveness	84.34	1 st
Construction method	24.27	33 rd
Project monitoring	43.21	21 st
Client satisfaction	45.87	18 th
Liquidity of organisation	40.75	23 rd
Cash flow of project	45.13	20 th
Project design cost	24.42	32 nd
Cost of rework	51.85	12 th
Cost of variation orders	45.66	18 th
Escalation of material prices	61.02	6 th
Waste rate of materials	76.78	3 rd
Client confidence in construction Team	31.37	29 th
Client emphasis of low construction Cost	78.27	2 nd
Client emphasis of high quality of Construction	56.29	9 th
Client emphasis of quick construction	49.04	16 th
Client ability to make decision	39.67	24 th
Client experience	25.40	31 st
Dispute between client and construction Team	39.51	25 th
Site prepration time	51.78	13 th
Time need to implement variation Orders	47.48	17 th
Average delay in claim approval	32.61	28 th
Unavailability of resources	74.36	4 th
Planned time for construction	35.79	27 th
Average delay in payment from owner To contractor	54.62	11 th
Average delay because closure leading To material shortage	57.07	8 th
Air quality	50.70	14 th
Noise level	19.30	34 th
Waste around the site	72.25	5 th
Climate conditions	41.31	22 nd
Earth quack possibility	15.33	35 th
Availability of water	50.57	15 th
Nature of soil	28.37	30 th

The relative importance and over all ranking & comparison of factors is shown in table 4.7 and fig. 4.2.

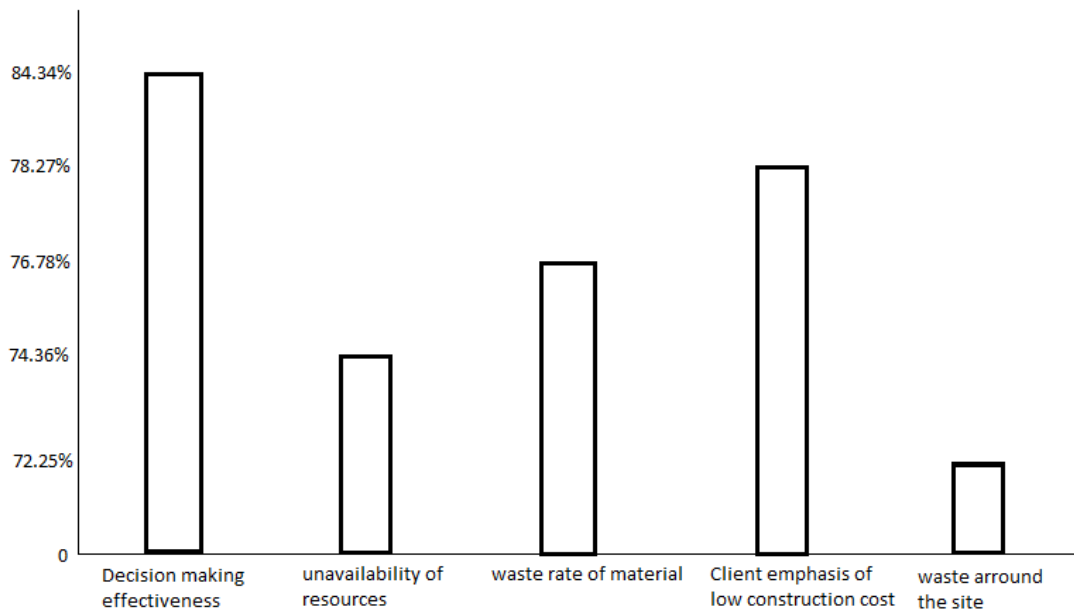


Figure 4.2: Comparison of factors

CONCLUSION

Results from this study are expected to help project management practitioners to achieve specific construction performance level. At that point, it will define the critical factors that prompt project success which was met through the accomplishments of the research. More importantly, a list of specific factors were identified as critical factors. The important conclusion withdrawn from the above study by both the techniques is that the project management are the most critical factor and followed by client, cost related, time related and environment factors in Gwalior division construction industries in India. Thus, this study conclude that for the success of construction project, above factors have to be managed carefully. This investigation likewise gives a appropriate direction to construction team and significant data to managers which can be used to manage their projects in a better and efficient way.

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