International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 06 | June 2018 www.irjet.net p-ISSN: 2395-0072

RANKING OF KEY DELAY FACTORS IN MULTI STOREY BUILDING PROJECTS

S. Karthik Ragunath[1], M. Shahul Hameed[2],

[1]*Assistant Professor, Department of Civil Engineering, P.S.R. Engineering College, Sivakasi, Tamilnadu, India*
[2]*Professor and Head, Department of Civil Engineering, P.S.R. Engineering College, Sivakasi, Tamilnadu, India*

Abstract - Delays are one of the biggest problems in construction projects in developing countries, as cause a negative effects on the projects. Delays can be minimized only when their causes are identified. The aim of this paper is to identify the main causes of delay in construction projects. The literature related the field of causes of delay in construction projects has been reviewed over the last decade. A questionnaire survey was conducted to solicit the causes of delay from consultants, clients and contractors' viewpoint. This study identified 10 most important causes of delay from a list of 45 different causes of delay. The elements of this list has identified on the basis of literature review over the last decade. The perspective of contractors and consultants has been analyzed to rank the causes of delays based on their Relative Importance Index. The 10 most causes of delay were: (1) Shortage of construction materials in market, (2) Escalation of material prices, (3) Delay in material delivery, (4) Demonetization issue of financial problem, (5) Shortage of labors, (6) Delay in payment of completed work by owner, (7) Changes in quality of material, (8) Poor labor supply & labor productivity, (9) Banking restriction, and (10) Unqualified workforce.

Key Words: Delay Causes, RII, Construction, multi-storey, building, questionnaire survey, etc

1. INTRODUCTION

Delays are one of the biggest problems which construction firms face. The problem of delay in the construction industry is a global phenomenon. Therefore construction delays can be considered as time lag in completion of activities from a fixed time as per contract or they can be defined as late completion or late start of activities to the planned schedule or contract schedule. When project delay occurs it means project cannot be completed within stated time, which means there will be extensions of time required which will further result in fine, increased cost due to inflation, termination of contract, court cases etc. or combinations of above stated factors. Delay can be seen as risk for the project and could be handled at inception stage or at least one can try to mitigate or minimize it. Risk is an integral part of a construction project; it is well known that no project is risk free. If risk is analyzed at inception or planning stage it could be managed, minimized, shared, mitigated or accepted to give some good results. Delay can be considered similar to risk or a type of risk; as no construction project is free from delays, delay is also integrated part of construction projects. It depends on size of project as well. Therefore it is expected to analyse and manage delay in same fashion as risk.

1.1 TYPES OF DELAYS

The following are the types of delays in construction projects

1) Critical or Non critical delays
2) Excusable or Non Excusable delays
3) Compensable or Non Compensable delays
4) Concurrent or Non concurrent delays

Critical or Non critical: In simple words Critical delays are those which cause delay to entire project completion date while Non critical delays not necessarily affect the project completion date but affects progress. In all the projects delays are considered at the project completion date. Delays can be combination of small and big delays that occurred during the whole project. Therefore critical delays are taken more into consideration then noncritical delays. Excusable or Non Excusable delays: Excusable delays occurs due to events which are outside the control of contractor like heavy rains, storms, strikes, fire, client suggested changes, differing site conditions, change of government policy or their intervention, stakeholder intervention etc., As name suggests these delays are such that they don't have any excuse or no excuse can be given for them. They arise due to carelessness or actions and inactions of contractors and subcontractors. For such delays no time extensions and monetary compensation is given to contractor if it has affected whole duration of project. Compensable or Non Compensable delays: As name suggests excusable compensable delays are those in which contractor is entitled for extra payment (compensation) i.e. monetary compensation and time extension as well. But decision that a delay is compensable or non compensable is taken as per contract between client and contractor. Natural disasters or some reasons which are out of control are not considered. Concurrent or Non concurrent delays: Concurrent delays which contains two or more excusable delays results in time extension. When compensable and non excusable delays are concurrent a time extension can be given or delay can be distributed between client and contractor.

1.2 MAIN OBJECTIVES

- To identify the various factors involved in delay causes in construction projects through literature survey and discussion with construction experts.
- To formulate the questionnaire by using collected data.
- To ranking the delay factors in Relative Important Index method.

2. LITERATURE REVIEW

Towhid Pourrostam and Amiruddin Ismail [1] "Causes and Effects of Delay in Iranian Construction Projects" The aim of this paper is to identify 28 main causes and 6 effects of delay in Iranian construction projects. A questionnaire survey was conducted to solicit the causes of delay from consultants and contractors viewpoint. Kasimu Alhaji Mohammed and Abubakar Danladi Isah[2] "Causes of Delay in Nigeria Construction Industry" The aim of this paper is to investigate the causes of delay in Nigeria construction industry. The data collected was analyzes in rating form to determine the most causes of delay in the construction projects. M.Haseeb,Xinhai-Lu, Aneesa Bibi, Maloof-ud-Dyian and Wahab Rabbani[3] "Problems of Projects and Effects of Delays in the Construction Industry of Pakistan" This paper covers the delay factors and causes of delay and some suggestion for reducing these delays in large construction projects in Pakistan. Murali Sambasivan ,Yau Wen Soon [4] "Causes and effects of delays in Malaysian construction industry" This study has also establishment an empirical relationship between each cause and effects. In this research we identify major causes of delay and categorized them as client-related, contractor –related, consultant –related, material-related, labor-related contract- related and external factors. Nitish Kumar and Peer Hilal Ahmad[5] "A Study on Delay of Construction projects in India" The development of country the construction the construction industry is the main ingredients for an economy. In India, most of the projects are executed through contracts which are generally not easy to comprehend. The primary objective during the construction process is to complete the project within budget, while meeting established quality requirements and other specification. Musirikare Mihigo Amandin and Julius Warren Kule [6] "Project Delay on Cost Overrun Risks: A Study of Gasabo District Construction Projects Kigali, Rwanda" The major causes of project delays and costs/risks that arise from project delays when implementing public construction projects. The study adopted a descriptive survey research design. Data were collected using open-ended questionnaire. Mohamed M. Marzouk and Tarek I. EI-Rasas [7] "Analyzing delay causes in Egyptian construction projects" This research presents a list of construction delay causes from literature. The feedback of construction experts was obtained through interviews. Statistical analysis is carried out using analysis of variance ANOVA method to test delay causes, obtained from the survey. Asish Ram and Dr. Pratheeba Paul [8] "Study on Construction Sequence Delay for Road Infrastructure Projects" Delays can lead to many negative effects such as lawsuits between owners and contractors, increased costs, loss of productivity and revenue, and contract termination. Megha Desai and Rajiv Bhatt [9] "Critical Causes of Delay in Residential Construction Projects: Case Study of Central Gujarat Region of India" This paper suggests an approach to carry out ranking of causes of delay by two different techniques: Relative importance index and Importance index based on degree of severity and degree of frequency and also discuss about the ranking of the causes.

2. RESEARCH METHODOLOGY

A structured questionnaire survey is designed to identify the factors influencing delay in the Indian construction industry. Questionnaire for the survey consists of two parts with the first part designed to gather information on the organization's profile and personal information of the respondent. The second part of the questionnaire includes forty five statements that tend to influence the delay in construction industry. Each statement is designed to elicit the respondents' opinions on the different attributes in the context of quality enhancement using a 5-point Likert scale, with point 1 representing Not Significant, point 2 representing Slightly Significant, point 3 representing Moderately Significant, point 4 representing Very Significant, point 5 representing Extremely Significant. A Questionnaire has been distributed to about 100 respondents, including client, contractor and consultant of the Indian construction industry and got the filled questionnaire back from 76 respondents at a response rate of about 76%. Descriptive statistics are used to analyze the raw data collected from the client, contractor and consultant and study their attitude towards these key delay factors in the construction industry. The Relative Importance Index (RII) method is used for the ranking of attributes in terms of their relative importance as perceived by the respondents. It is a commonly used method of construction where a structured questionnaire contains the measurements that are subjective in nature. The mean item score for each indicator within constructs is calculated to obtain the Relative Importance Index(RII)as follows.

4. DATA ANALYSIS AND RESULT

Statistical tests and analysis carried out for the factors of each of the sections. These include the causes of delay, effects of delay, the risks of delay as well as ways of mitigating delays. It also presents the results of the questionnaires which were carried out using Relative Important Index (RII). To determine the relative ranking of the factors, mean values were then transformed to importance indices based on the formula:

$$\text{RII} = \frac{\sum w}{AN} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{5N}$$

Where, *w* is the weight given to each factor by the respondent, ranging from 1 to 5, (*n1* = number of respondents for very unsatisfied ... *n5* = number of respondents for very satisfied) A is the highest weight (i.e. 5 in the study) and *N* is the totalnumber of samples.

Table -1: Overall RII and Ranking of Delay factors

Sl. No.	Factors that the delay in construction	RII	Rank
1.	Poor communication & co-ordination by owner and other parties	0.460	34
2.	Misunderstandings in technical dealing with tenders & contractors	0.488	19
3.	Conflict in joint ownership	0.446	38
4.	Delay in payment of completed work by owner	0.560	6
5.	Late revising and approving relevant documents by owner	0.508	12
6.	Less authority given to consultant to take decision	0.462	32
7.	Unclear and inadequate details in drawings	0.464	31
8.	Communication barriers faced by consultant	0.416	44
9.	Total quality management by consultant	0.442	39
10.	Inadequate site information given to consultant	0.476	24
11.	Ineffective planning and scheduling of project	0.508	12
12	Delay in preparation of shop drawing and material sample	0.488	19
13.	Delay in site mobilization	0.502	15
14.	Compatibility of contractor with new software's	0.450	37
15.	Risk analysis & management by contractor	0.474	26
16.	Source updating in the design engineering documents & related	0.462	32
17.	Shortage of construction materials in market	0.578	2
18.	Delay in material delivery	0.574	3
19.	Changes in quality of material	0.544	7
20.	Escalation of material prices	0.584	1
21.	Material damage in storage	0.486	22
22.	Slow process of material selection	0.508	12
23.	Shortage of labors	0.564	5
24.	Unqualified workforce	0.514	11
25.	Equipment availability and failure	0.496	17
26.	Shortage of recent technology equipment	0.474	26
27.	Delay in equipment delivery	0.518	10
28.	Poor labor supply & labor productivity	0.532	8
29.	Traffic control at site	0.376	45
30.	Insufficient data collection and survey	0.440	41
31.	Accidents on site	0.454	35
32.	Rework due to error in construction	0.502	15
33.	Problem due to existing structures	0.480	23
34.	Unforeseen ground conditions	0.466	29
35.	Bad weather condition and poor lighting	0.442	39
36.	Environmental changes due to rainy and hot season	0.452	36
37.	Natural disasters (Earthquake, floods etc.,)	0.476	24
38.	Inclement weather effects	0.424	43
39.	Effects of subsurface conditions(soil, high water table etc.,)	0.466	29
40.	Changes in government regulation & laws	0.496	17
41.	Restriction due to site location	0.488	19
42.	Regulatory changes in building code	0.472	28
43.	Various issues in respective states	0.436	42
44.	Demonetization issue of financial problem	0.572	4
45.	Banking restriction	0.524	9

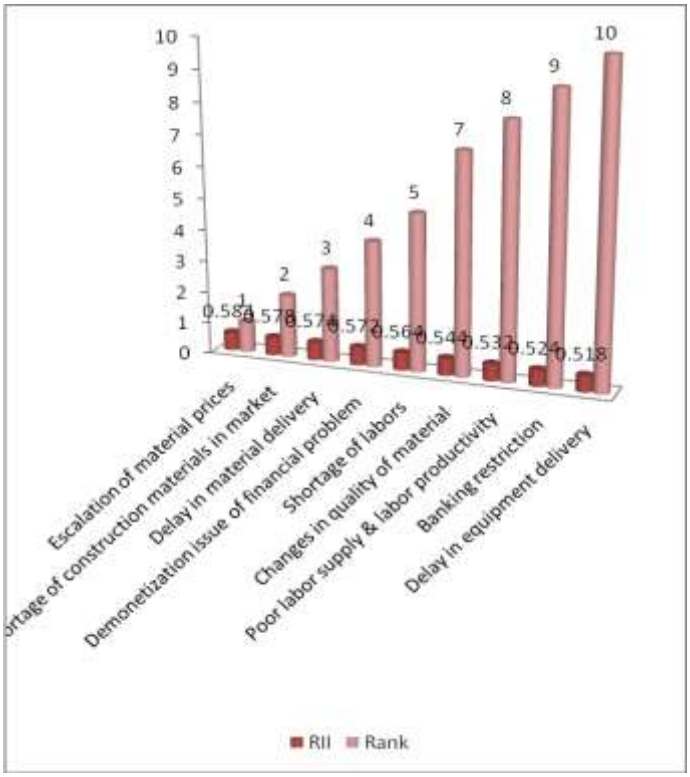

Chart -1: Most influencing delay factors

Table -2: Top ten ranking of delay factors

Sl. No.	Factors that the delay in Construction	RII	Rank
1.	Escalation of material prices	0.584	1
2.	Shortage of construction materials in market	0.578	2
3.	Delay in material delivery	0.574	3
4.	Demonetization issue of financial problem	0.572	4
5.	Shortage of labors	0.564	5
6	Delay in payment of completed work by owner	0.560	6
7.	Changes in quality of material	0.544	7
8.	Poor labor supply & labor productivity	0.532	8
9.	Banking restriction	0.524	9
10.	Delay in equipment delivery	0.518	10

5. DISCUSSION

The Most Important Factors That Causes Delays based on the above discussion, a total forty five factors that contributed to the causes of delays in construction project were identified, ranked and analyzed in India. In order to identify the most important factors that contribute to the causes of delays analysis was conducted to determined. Analysis and Identification of Critical Factors of Delay in Construction Projects and top ten factors of the overall ranking factors that cause delays as shown in chart -1. The top ten most significant factor such as Escalation of material prices, shortage in construction materials, Delay in material delivery, Demonetization issue of financial problem, Shortage of labors, Delay in payment of completed work by owner, Changes in quality of material, Poor labor supply & labor productivity, Banking restriction, Delay in equipment delivery. From the top ten factors to causes of delays, there are 4 factors of material related delays, two factors of cost related delays and two factors of manpower related delays. This shows that there are 40% factors of material related delays.

6. CONCLUSIONS

This study identified the causes of delay in construction projects. Projects investigated in this study included residential, office and administration buildings. A questionnaire survey was conducted to solicit the causes and effect of delay from consultants and contractors' viewpoint. Ten most causes of delay were: (1) Shortage of construction materials in market, (2) Escalation of material prices, (3) Delay in material delivery, (4) Demonetization issue of financial problem, (5) Shortage of labors, (6) Delay in payment of completed work by owner, (7) Changes in quality of material, (8) Poor labor supply & labor productivity, (9) Banking restriction, and (10) Unqualified workforce.

This paper has highlighted factors and the need to reduce delays by client, consultants and contractors. Clients should make progress in payments to contractors on time, recruit competent project manager, and on time preparation and procurement of needed materials to the contractors. Consultants have to try to manage the project professionally, complete and prepare design on time, using professional specialists and implementation of accurate per-design for minimizing future changes. Contractors need to available source of finance during construction project, proper materials procurement, and developing human resources.

REFERENCES

[1] Towhid pourrostam and Amiruddin Ismail "Causes and Effects of delay in Iranian Construction projects" IACSIT International Journal of Engineering and Technology Vol. 4, No.5, Oct 2012.

[2] Kasimu Alhaji Mohammed, "Causes of Delay in Nigeria Construction Industry", Interdisciplinary Journal of Contemporary Research In Business,Vol.4, No.2, June 2012.

[3] M. Haseeb, Xinhai-Lu, Aneesa Bibi, Maloof-Ud-Dyian. "Problems Projects and Effects of Delay in the Construction Industry Pakistan", Australian Journal of Business and Management Research, Vol.1, No.5 [41-50], 2011.

[4] Murali Sambasivan, "Causes and Effects of Delay In Malaysian Construction Industry" Graduate School of management, University Putra Malaysia, 43400 UPM, Serdang Selangor, Malaysia Received 21 April 2006;

[5] Nithish kumar and Peer Hilal Ahmad, "A Study on Delay of Construction projects in India" Under Graduate Student, Department Of Civil Engineering, Tula's Institute, Dehradun(U.K). Vol.3, Issus 5; April-June,2016.

[6] Musirikara Mihigo Amandin1, Julius Warren kule "Project Delays on Cost Overrun Risks: A Study of Gasabo District Construction Project Kigali, Rwanda" Director Of The Business Development and Employment Promotion Unit, Kigali City, RWANDA, Vol.5, No.1, 2016.

[7] Mohamed M. Marzouk, Tarek 1.EI-Rases "Analyzing Delay Causes in Egyptian Construction Projects", Structural Engineering Department , Faculty of Engineering Cairo University, Egypt, 2014.

[8] Asish Ram, Dr.Pratheeba paul,"Study on Construction Sequence Delay For Road Infrastructure Projects", M.Tech Department of Civil Engineering,Hidustan Institute of Technology and Science,Chennai India,Vol.12, April 2015.

[9] Megha Desai,Rajiv Bhatt, "Critical Causes of Delay in Residential Construction Projects:Case Study of Central Gujarat Region of India",Vol.4, Issues 4, April 2013.

[10] Kasimu Alhaji Mohammed, "Causes of Delay In Nigeria Construction Industry", Interdisciplinary Journal of Contemporary Research In Business,Vol.4,No.2, June 2012.