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Delay Analysis in Construction Project

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Abstract: ***Nowadays, in INDIA, delay in construction project is increasing which severely affects the time and cost of construction project. Delay can be defined as "an act or event that extends the time required to perform tasks or activities under a Contract". It is usually reflected as additional days of work need to complete whole or part of project.This paper aims to find out the most significant factors causing delays in Indian construction projects like residential building through questionnaire survey. The Questionnaire survey is conducted with the participants (contractors, owners, consultants and others) of particular residential building in order to shortlist significant factors by using Relative Importance Index (RII) and finally recommendations are given to avoid delays in construction project.***

Keywords: Delay, Construction Management, Causes of Delays, Effects of Delays, RII

I. INTRODUCTION

Delay in construction project refers to an unexpected and unplanned activities of project due to some factor. DELAY may or may not include change(s) in the scope of work of activity(s) or the Contract .DELAY may or may not shift the overall completion date of a contractor the entire scope completion date i.e. DELAY may or may not be on the critical path. When the project gets delayed, either the delivery time of the project will be extended or the progress of the project will be increased heavily in order to deliver it on time. A number of controllable and uncontrollable factors can adversely contribute to disturb the project plan and create tendency of delays. The challenge is to find out remedial measures occurring due to delay with the help of questionnaire survey.

The construction process could be divided into three phases, i.e. conception of the project, designing of the project and finally construction of the project. A delay in a construction project can be caused either by owner or by the contractor or by numerous other reasons. Completing the project on specified time saves lots of money which is an indication of efficiency and an effective project management, however, it is a rare case of happening.

There are three basic ways to categorize type of delays:

A. Critical and noncritical – Delays that affect the project completion are known as critical delays and that do not affect the project completion are known as non-critical delays.

B. Excusable and Non-excusable – An unforeseeable event beyond the contractor's control is excusable delay and non-excusable delays are events that are within the contractor's control.

C. Compensable and non-compensable – A compensable delay is a delay where the contractor is entitled to the time extension and to additional compensation .Non-compensable delays mean that although an excusable delay may have occurred, the contractor is not entitled to any added compensation resulting from the excusable delay.

II. AIM AND OBJECTIVE

A. To study delay analysis of residential building for planning and scheduling the activities.
B. To identify various causes of the delays.
C. To understand the effects of the delays on the project.
D. To determine the major construction delays of the project.
E. To measure the net impact of construction delays accurately.

III. CAUSES AND EFFECTS OF DELAY

Causes

A. Group-A Owner Contributed Factors

1) Delay in progress payment by owner
2) Change order by owner during construction
3) Decision making process

B. Group-B Contractor Contributed Factors

1) Difficulties in financing
2) Rework due to error during construction
3) Ineffective planning and scheduling

C. Group-C Consultant Contributed Factors

1) Improper construction method
2) Delay in major change
3) Poor communication
4) Dispute between consultant designer

D. Group-D Designer contributed factors

1) Mistakes in design documents
2) Delay in producing design documents

E. Group-E Labour Contributed Factors

1) Shortage of labour
2) Unqualified workforce
3) Personal problem of labour

F. Group-F Material Contributed Factors

1) Changes in material types and specifications
2) Damage of stored material
3) Delay in material delivery

G. Group-G Equipment Contributed Factors

1) Equipment breakdowns
2) Low productivity and efficiency of equipments
3) Low level of equipment-operator skills

H. Effects of Delay

1) Time and cost overrun
2) Much reduction in profit for the contractor
3) Non-productivity loss for the owner
4) Extended stay of construction phase
5) Damage for the company's reputation
6) Dispute, Arbitration or Litigation b/w the participants of the project
7) Difficulty in improving the market value of the contractor's company

IV. METHODOLOGY

By assuming random sampling technique, a total number of 50 questionnaires were sent to many persons related to construction field. In that, 10 to workers, 20 to contractors, 10 to consultant, 10 to other parties.

Relative Importance Index method is adopted to determine the relative importance of the various causes of delays. In this case, three-point Likert scale were adopted which ranges from 1 (disagree) to 3 (agree) and transformed to relative importance index (RII) for each factors using the formula shown below:

Relative Importance Index,

$$RII = (1*n1+2*n2+3*n3)/N\ (n1+n2+n3)$$

1n1 = the no of respondents who answered 'Disagree'
2n2 = the no of respondents who answered 'Moderate'
3n3= the no of respondents who answered 'Agree'

Step -1: Questionnaire Survey

1) Questionnaire Survey was conducted to record the impact of delay causing factors and their influence on delays**.**

For Residential Building Work Factors affecting delays are:

1) Owner

2) *Contractor*
3) *Consultant*
4) *Design*
5) *Material*
6) *Equipment*
7) *Labour*
8) *Other*

TABLE 2
DELAY CAUSING FACTOR

Group	Individual Cause	RII (%)	RANK
Owner			
1	Delay in progress payment by owner	63	V
2	Change order by owner during construction	66	III
3)	Delay in revising and providing design documents by owner	63	V
4)	Delay in provision of material by owner	65	IV
5)	Poor communication and co-ordination with others	70	I
6)	Decision making process	67	II
7)	Suspension of work	67	II
Contractor			
1	Difficulties in financing project	65	III
2	Rework due to error during construction	66	II
3	Dispute between contractor & other parties (consultant & owner)	61	IV
4	Poor site management and supervision by contractor	65	III
5	Ineffective planning and scheduling	72	I
Consultant			
1	Improper construction method	66	III
2	Delays in inspection and testing	63	V
3	Delay in major change	67	II
4	Poor communication	65	IV
5	Dispute between consultant designer	72	I
Design			
1	Mistakes in design documents	61	V
2	Delay in producing design documents	65	III
3	Unclear and inadequate details in drawing	68	II
4	Insufficient data collection and survey before design	70	I
5	Misunderstanding of owner requirements by design Engineer	64	IV
Material			
1	Changes in material types and specifications	71	II
2	Delay in material delivery	65	V
3	Damage of stored material	69	III
4	Delay in manufacturing special building material	67	IV
5	Late in procurement of material	73	I
Equipment			
1	Equipment breakdowns	56	III
2	Low level of equipment-operator skills	60	II
3	Low productivity and efficiency of equipments	70	I
Labour			

1	Shortage of labour	58	IV
2	Unqualified workforce	64	III
3	Low productivity of labour	65	II
4	Personal problem of labour	69	I
Other			
1	Climatic conditions	61	II
2	Unavailability of utilities (water, electricity, etc.)	59	III
3	Effect of social and cultural factors	64	I

V. CONCLUSION

As per the survey conducted above, the major reasons behind all these causes of delays are lack of coordination between project participants and dispute between them. The commitment of the project participants also affects the quality and the progress of the project. Contractors should properly plan and schedule the project as per MSP Software. Labors and supervisors should be well trained with effective training program to improve their skills and knowledge. Materials should be properly delivered as per the site requirement. Owner should have awareness regarding changes in the market and providing essentials like water and electricity supply.

With the help of above survey factors to be undertaken by the followings:

Owner - Poor communication and coordination with others

Contractor -Ineffective planning and scheduling.

Consultant - Dispute between consultant and designer

Design- Insufficient data collection and survey before design.

Material - Late in procurement of material.

Equipment - Low productivity and efficiency of equipment.

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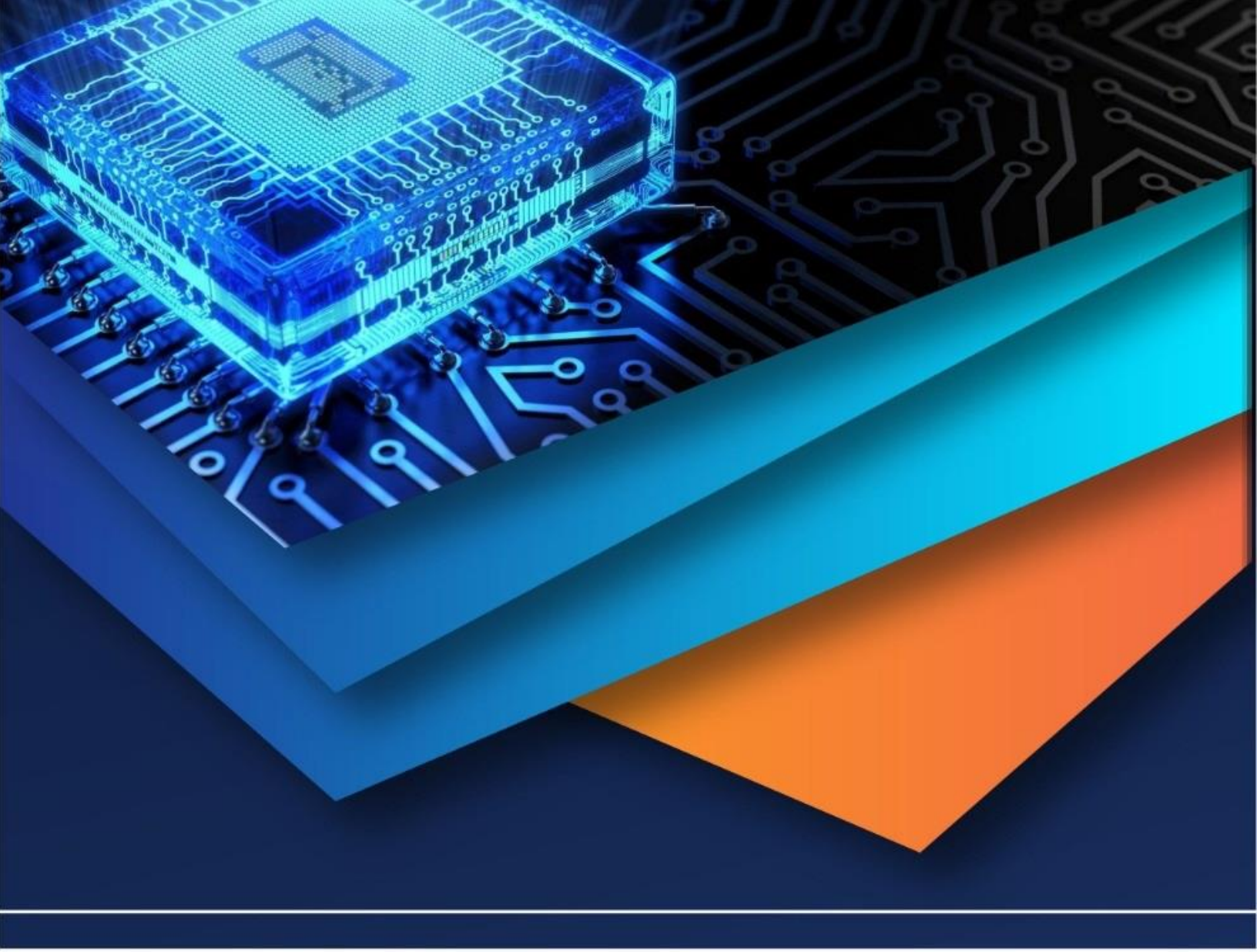

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