RANKING OF DELAY FACTORS FOR RESIDENTIAL CONSTRUCTION PROJECTS

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Abstract - *One of the most common problems in the construction project presently are delays. Delay can be defined in two different ways: the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. In other words; Delays of a construction project can be defined as the late completion of works as compared to the planned schedule or contract schedule.*

Construction is a dynamic, competitive, constantly developing and taxing industry. Construction projects can be delayed for a large number of reasons. Different categories of delays and different types of delays are found on construction projects. Delays can be reduced when their sources are identified. Since the problems are rather contextual, the studies need to focus on specific geographical area, country or region.

Delay may occur early or later in the project development. Delay in projects can occur due to many of reasons that may be due to the client, the contractor, natural calamities, or a third party. Delays can be lessened only when their cause are recognized.

The objective of this study is to identify the major causes of delays, the effects of delays, finding importance of each delay factors by Importance and Relative Importance. The delay factors were identified and grouped accordingly. The major causes which affected the overall residential projects are: External Factors, Contractor Factors, Material Factors, Owner Factors, Design Factors, Equipment Factors, Consultant Factors, Labor Factors and Project Related Delay Factors.

Controlling and monitoring should be established to enhance project performance in order to minimize or avoid delay in construction projects. The findings of this study were to help the owners / contractors to identify the factors causing delay to minimize the risk of damage.

Keywords- *Construction Project Delays, Questionnaire, Relative Importance Index, Importance Index, Factors Delaying Construction Project.*

I. INTRODUCTION

In construction, delay could be defined as the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. To the owner, delay results in loss of revenue through lack of production facilities and rent-able space or a dependence on present facilities.

Timely completion of project indicates efficiency, but the construction process is subject to many variables and incalculable factors, which result from many sources. These sources include the capability of parties, availability of resources, environmental conditions, involvement of other parties, and contractual relations. However, only in rare case a project is completed within the specified time limit.

Delay is a situation when the contractor, consultant, and client jointly or individually contribute to the non-completion of the project within the original or the stipulated or agreed contract period. Delays give rise to disruption of work and loss of productivity, late completion of project, increased time related cost, third party claims and abandonment or termination of contract. It is important that general management keep record of project progress to reduce the possibility of delay occurrence or identify it at early stages.
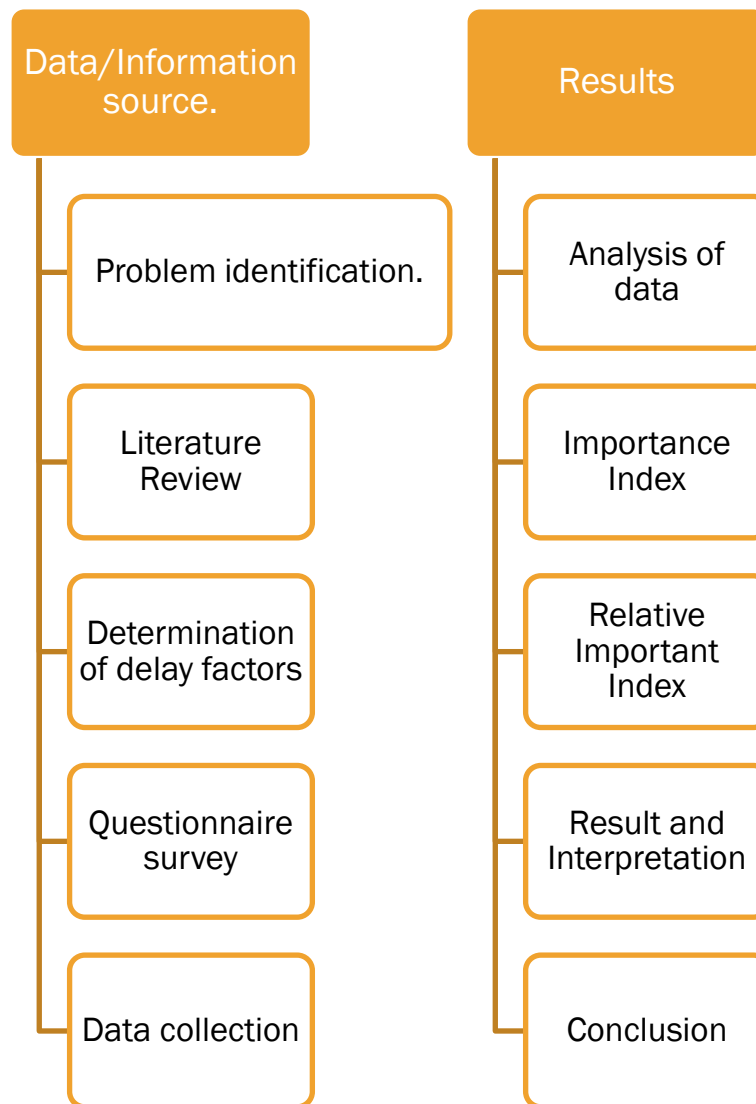
II. METHODOLOGY

1) **PRIMARY DATA:**

Questionnaire survey carried out from Interviews and Site Visits to get in-depth information.

2) **SECONDARY DATA:**

Review of literature carried out through local & international papers, books, internet etc. Questionnaires prepared based on factors identified from various literatures.

Data/Information source.	Results
Problem identification.	Analysis of data
Literature Review	Importance Index
Determination of delay factors	Relative Important Index
Questionnaire survey	Result and Interpretation
Data collection	Conclusion

III.   RANKING METHOD

A)   Relative Importance Index (RII):

The Relative Importance Index (RII) ranking method determines the ranks of the different causes of delay. Ranking assigned to each cause of delay, helps to identify the most critical delay factors in the construction industry. The RII has been used in many domains to assess the comparative significance of a single item to others. Relative Importance Index or weight is a type of relative importance analyses.

The equation given below was used to compute the relative importance index for all the causes. (RII) for each factor is referred from Journal Paper of Desai Megha-(2013) and is given as follows:

$RII = \sum W / A * N$

Where, W = Weightage of each factor (ranging from 1 to 5), A is 5 (highest weight) and N is the Total number of Respondents

The RII value had a ranges from 0 to 1 (0 not inclusive), higher value of RII indicates that a factor is more important delay factor to the Construction industry.

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RII Chart
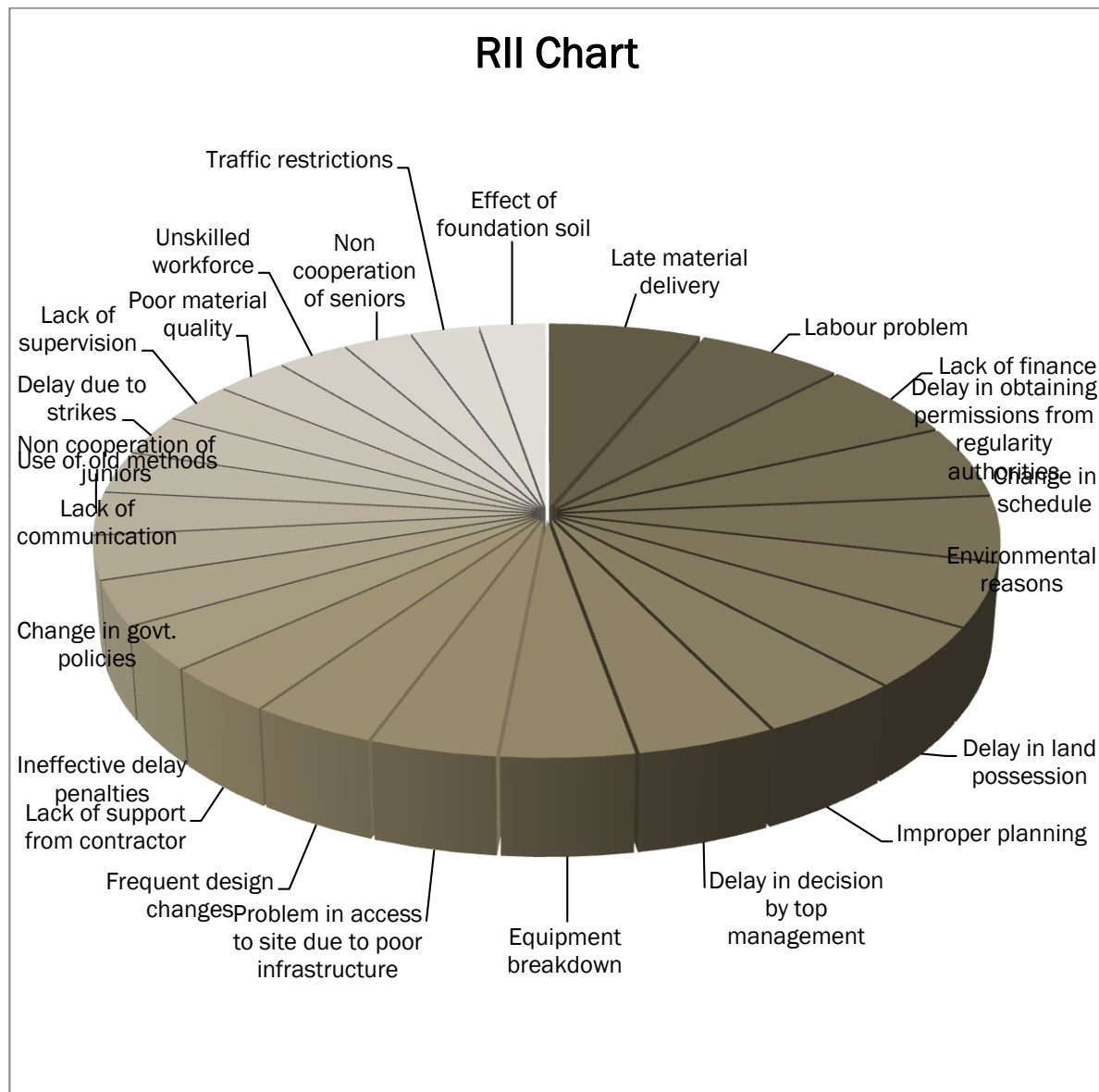
B) **Importance Index (I):**

The other method of finding the importance of affects of these delay factors is Importance Index Method. The method is different from Relative Importance Method but the results of both the methods are similar to each other. The method and Formula used for both the methods are different. The value of Importance Index is in Percentage and ranges from 1 to 100% as in case of Relative Importance Index it ranges from 0 to 1. Highest is the value of Importance Index greater is the affected delay on sites. In the graphs below Importance Index value is shown in percentage value.

The collected data was studied using an importance index. In this method the total responses from the entire questionnaire are collected together and multiply it by the frequency of respondent to the different ranges of ranking and found its result. The importance index was computed from the literature paper of Abd El-Razek-(2008). The formula for Importance Index is given by:

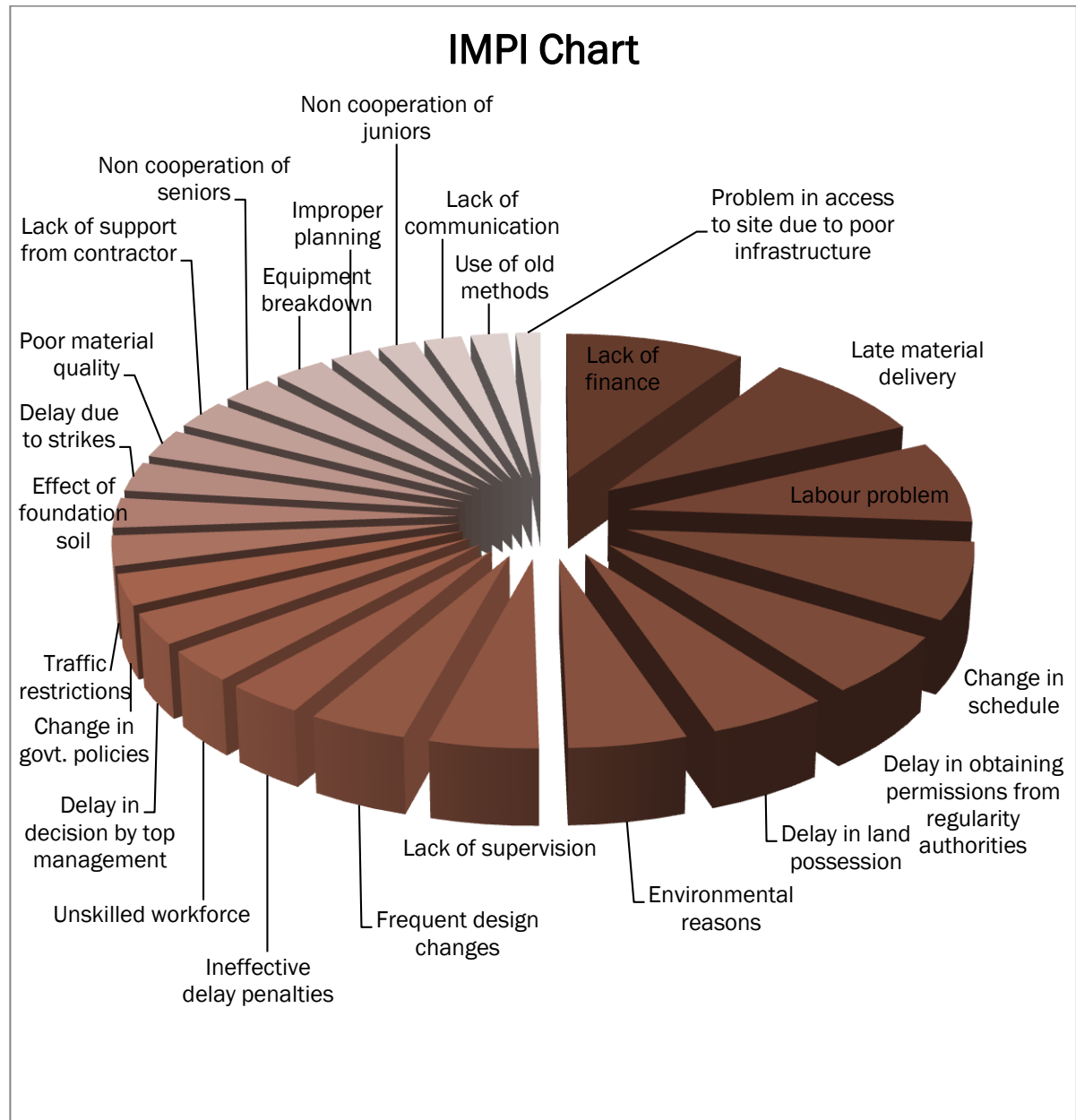Frequency Index (F.I.)(in percentage) = $\sum a (n/N) * 100/4$

Where, I = importance index a_i= constant indicating the weight of the 4th response, x_i = frequency of the 4t h response given as a percentage of the total responses for each cause.

Severity Index (S.I.)(%)= $\sum a (n/N) * 100/4$

Where, 'a' is the constant indicating weightage given to each response (ranges from I for little up to 4 for severe), n is the frequency of the responses, and N is total number of responses.

Importance Index (IMP.I.)(%) = [F.I.(%)* S.I.(%)]/100

IMPI Chart

Non cooperation of juniors

Non cooperation of seniors

Lack of support from contractor

Improper planning

Lack of communication

Problem in access to site due to poor infrastructure

Equipment breakdown

Use of old methods

Poor material quality

Lack of finance

Late material delivery

Delay due to strikes

Effect of foundation soil

Labour problem

Traffic restrictions

Change in schedule

Change in govt. policies

Delay in obtaining permissions from regularity authorities

Delay in decision by top management

Delay in land possession

Unskilled workforce

Lack of supervision

Environmental reasons

Ineffective delay penalties

Frequent design changes

IV.   CONCLUSION

Delays can be circumvented or minimized when their causes are clearly identified. The aim of this report was to identify the factors which imparts delay in construction projects, since delays are considered to be a serious problem in the construction industry.

Following steps can be recommended in order to minimize and limit delays in construction projects:

- The lack of finance and late material delivery can have major impact on the projects.
- Labour problem and change in schedule should be made in a correct manner. Administrative staff should be allocated to make necessary arrangements to complete the project within specified time while satisfying required quality and estimated cost.
- Approval of design documents should not be delayed, since it could delay the progress of work. Progress payments should be timely given to contractor, to finance the work.
- Improving in planning and supervision is necessary**.**

V.   ACKNOWLEDGEMENT

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