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Study of Delay Analysis in Residential Building Project Fuzzy Approach

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Abstract – Due to the inherent risks and increasing complexity of modern construction projects, industry delays and cost overruns have become commonplace. Researchers and practitioners used a number of methods to assess the liability of project delays and fear delays among the participating parties. Survey base delay analysis is considered to be one of the most reliable methods to analyze construction delay. Despite its advantages, survey analysis can give different results depending on the amount of data collected, which can be considered as acceleration by the employer and the contractor, as well as the impact of many infrastructure upgrades made due to changes in the logical relationships of duration and operations in a systematic way. , And the impact of progress events on the over-allocation of resources can be considered and consequently delayed. This study proposes a survey basis on analytical models that can consider several factors influencing construction delay. In this work we have proposed a blurred base waiting and recommendation approach, which can take into account many of the factors included in the survey. Finally the system recommends various ranking factors that cause delays along the graph. Mixed research applies to any type of construction project.

Keywords – Delay Analysis, Construction Delay, Factors and Fuzzy Base Weighting.

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1. INTRODUCTION

"Delay" means that any kind of work is going on uninterrupted, but there is more time than scheduled. Delay is a term used to refer to any activity that slows down without stopping construction completely and can lead to a contract date beyond this. They are classified as non-delayed, particularly unfavorable delay, specific complete delay and simultaneous delay. There are many factors that can directly or indirectly cause delays. Dependence on projects can be delayed for a number of reasons due to client, contractor or any third party. Delay in construction projects is very costly; Sometimes the parties involved cause serious harm. This research focuses on studying the major factors that reduce delays and analyzing daily records to reduce delays. The purpose of this study is to identify the main causes of delay, the effects of delay and ways to reduce the delay. Construction project.

In some cases, the contractor and the owner pay an additional fee to complete the project. Construction is delayed when the time exceeds the allotted time. Many construction projects have encountered various problems and time delay is one of the major problems. In most of the cases studied under the survey, the main reason for the delay was disputes between the customer and the contractor. It is therefore necessary to know the exact cause of the delay and take steps to prevent further harm to the participants. The present study focuses on various causes of delay:

- To study the effect of delay in construction projects and to understand the factors affecting delay based on data collected from various sites.
- Identify the principles that lead to structural delay.
- Doing delay analysis using RII technique.

2. METHODOLOGY

The major aim of the present study is to identify the causes and effects of delays in the Indian construction industry. In this work a blurred waiting and recommendation approach is proposed, which includes several elements. Causes are usually classified as contractor risk events or employer risk events. If any event is not confirmed, it is considered a risk factor.

This study has been carried out by adopting following methodology.

- Literature review.
- Commercial Basic data collection from various commercial sites.
- Selecting a Site for Case Study.
- Apply the blur policy to the collected data and find the factors that cause delays in the use of blur weights.
- Study Define the conclusion based on the current study.

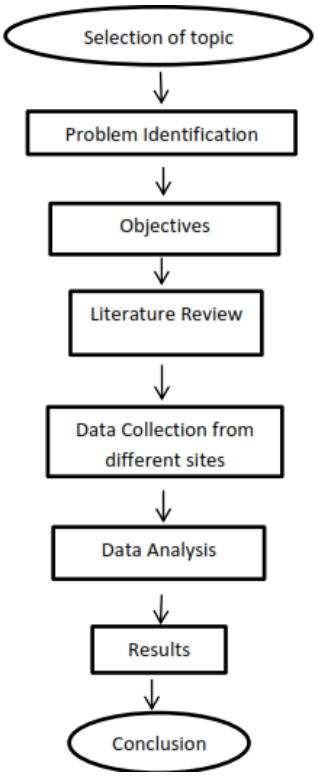

Fig. 1 Flowchart of Methodology

2.1 MATLAB Fuzzy Toolbox

2.1.1 FIS Editor:

This editor, along with 4 other editors, provides a powerful environment for defining and modifying the Blurred Infection System (FIS) variable.

2.1.2 Fuzzy Controller:

This is a block in the Blur Toolbox library in Simulink environment. This block accepts FIS variables generated by the FIS editor and implements the desired rules

3. DATA COLLECTION FROM DIFFERENT SITES

3.1 Name of Project: COLORI Phase-2

The first site I surveyed was commissioned by Amit Enterprises Colorie Phase-2 at Andari (41,606) in Pune. There are two buildings (H, I) which are delayed and therefore are considered for survey. Buildings G + 12 floors front margin 9M and rear margin 12M. The plan includes 288 flats measuring 1 bhk (520 sq ft), 2 bhk (840 sq ft), 12 shops.

3.2 Name of Project: VTP Urban Next

The other site I studied for was the NTPAYA Group name VTP Urban Next, located in Pisoli, Pune. The project consists of eight buildings (A1, A2, A3, B1, B2, B3, C1, C2). Buildings G + 11, front margin 20M and rear margin 20M. It has 462 flats 2 bhk (820 sq ft), 3 bhk (1100 sq ft), 80 shops.

3.3 Name of Project : Suvidha Nisarga

The third site I studied was Nishirga at Khed Shivpur in Pune. Buildings have a front margin of 3m and a rear margin of 3m. The project includes G + 5 storey buildings with 36 flats. 1 bhk (610 sq ft), 2 bhk (870 sq ft).

4. DATA ANALYSIS

The collected responses and case study results are maintained by the function. Since most of the work results were associated with detailed results from the respondents, it helped to organize the factors according to the results that the respondents found from the description. This work has helped in analyzing the impact of delays in the construction industry following the ranking development of causes that result from construction process delays. Appropriate analytical performance is associated with an appropriate connection to what is found with an understanding of the concept developed in the literature review section.

Following factors are analyzed:

- Related customer related factors: finance and payment of work completed etc.
- Contractor related factors: Errors in the planning and construction phase
- Related factors: Contract management, drawing and approvals, quality assurance
- Related content related factors: the quality of the material and when the content is reduced.

- Related customer related factors: finance and payment of work completed etc.
- Contractor related factors: Errors in the planning and construction phase.
- Related factors: Contract management, drawing and approvals, quality assurance
- Related content related factors: the quality of the material and when the content is reduced.

The RII method is used to calculate the most important factor due to the delay. The survey form has a scale of 1 to 5. It is represented in mathematics,

$$RII = \sum W \div (A*N)$$

Where,

W = weight assigned by the respondents for each factor (1 to 5)

A = maximum weight (i.e. 5 in this case)

Answer = Number of respondents. The higher the RII value, the more important the delay.

5. OVERVIEW OF FINDINGS

The following results are obtained after analyzing Site-1 (Color Phase-2): Major delays caused by Site-1 are customer related factors.

Table No. 1 Major delay causing factors for Site-1

Client Related Factors / Respondents	Project Manager	Planning Engineer	Site Engineer	Labour	RII
Finance and payments of completed work	3	2	3	4	0.60
Owner interference	3	4	1	5	0.65
Slow decision making	4	5	5	5	0.95
Unrealistic contract duration and requirements imposed.	5	5	5	5	1
Obtaining permits from municipality	4	5	4	2	0.75

After analysing site- 2 (VTP Urban Next) following results are obtained: Major delay causing factors are Contract Related Factors.

Table No. 2 Major delay causing factors Site 2

Contractor Related Factors/ Respondents	Project Manager	Planning Engineer	Site Engineer	Site Supervisor	RII
Sub-Contractor	4	3	4	5	0.80
Site management	1	4	5	5	0.75
Construction methods	1	3	2	3	0.45
Preparation and approval of drawings	4	5	4	3	0.80
Mistakes during construction stage	5	4	3	3	0.75
Inadequate contractor Experience	5	5	4	4	0.90
Mistakes in preliminary stage (Soil investigation)	5	5	4	5	0.95
Financing by contractor during construction	5	5	5	5	1

After analysing Site-3 following results are obtained: Major delay causing factors are Material Related Factors and Labour Equipment Factors.

Table No. 3 Major delay causing factors Site 3

Material Related and Labour Equipment Factors/ Respondents	Project Manager	Planning Engineer	Site Engineer	Site Supervisor	RII
Quality in material	4	3	4	4	0.74
Shortage in material	5	5	5	5	1
Labour supply	5	5	5	3	0.90
Labour Productivity	3	4	2	3	0.60
Equipment availability and failure	4	3	3	5	0.75

6. RESULTS AND DISCUSSION

The constructed fuzzy assessment model will be developed by using Fuzzy Logic Toolbox of the MATLAB Program Software.

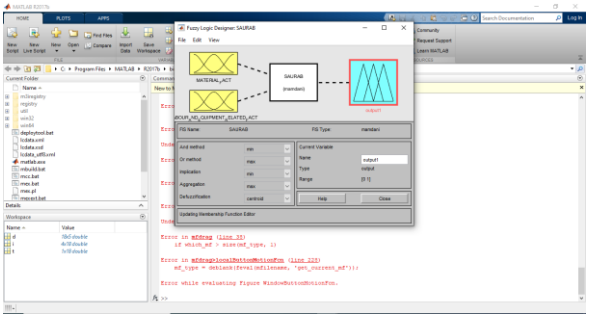

Fig 2 Add inputs in FIS Editor

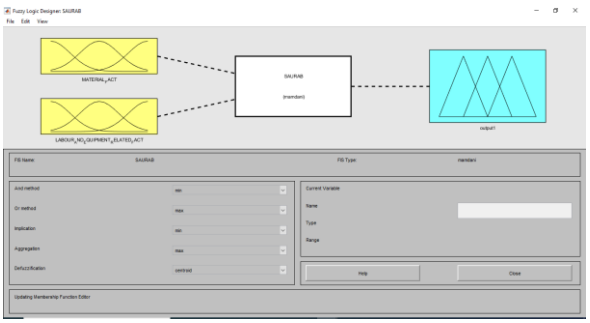

Fig 3 Updating membership functions

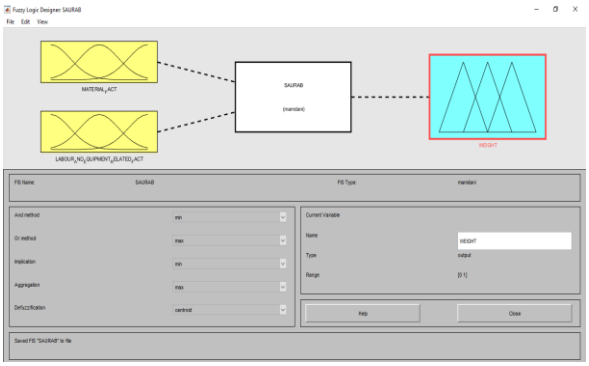

Fig 4 Save FIS

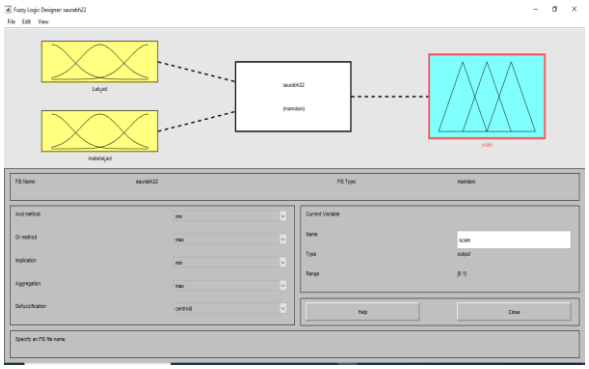

Fig 5 Specify FIS File name

Fig 6 FIS Variables for Labour

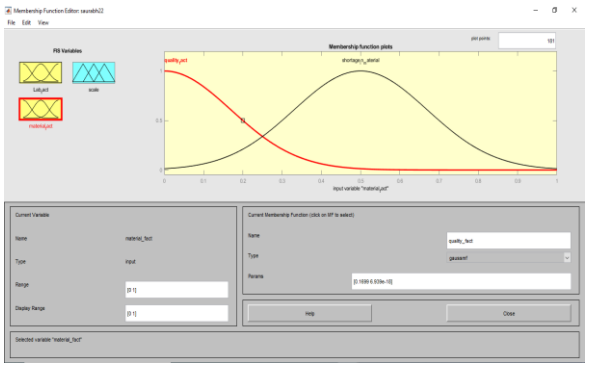

Fig 7 FIS Variable For Material

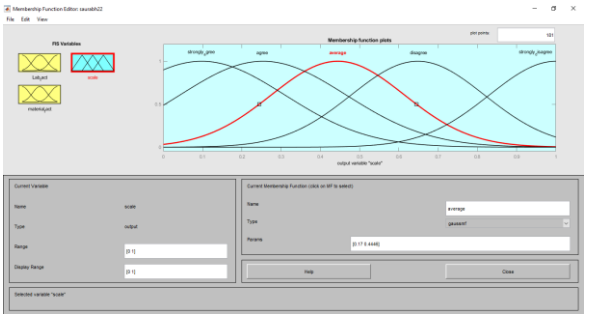

Fig 8 RS Variables Outputs

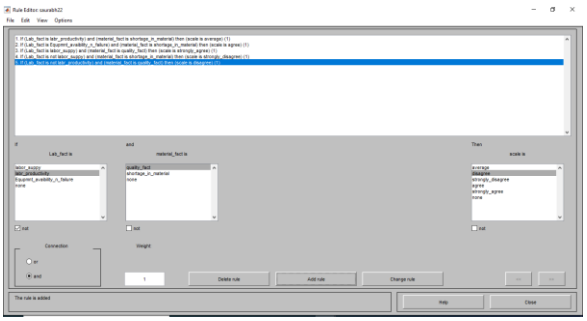

Fig 9 Fuzzy logic Results for labour and material

7. CONCLUSION

The collected responses and case study results are maintained by the function. Since most of the work results were associated with detailed results from the respondents, it helped to organize the factors according to the results that the respondents found from the description. This work has helped in analyzing the impact of delays in the construction industry following the ranking development of causes that result from construction process delays.

1. The main delay factor of site-1 is the unrealistic contract term R, because it has the highest value of RII.

2. The delay factor for Site-2 is the lack of contractor financing during construction, as RII represents the highest value.

3. The main delay factor of site-3 is the lack of material that gives the highest RII value.

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