

Delay Analysis: By using RII Method

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Abstract— Delay is the most common term in construction industry in India. Construction industry plays the vital role in the Indian economy. There are various reasons for the delay, from the last few decades researcher search the various techniques to analyses the delay. Delays in construction projects are quite expensive, sometimes they may result in sever damages to the involved parties. This dissertation focuses on study of core factor that are causing delays and analyzing the day to day records to minimize delay. But in India 2016, Indian construction industry has found that the delay reasons due to change in the system parameter, where it contains the various aspects to analyze the causes of delay. Indian government has announced the new law of GST, RERA (Real estate regulatory Authority) and demonetization it causes the dramatic change in the Indian construction industry. The current case study is undertaken on construction of new residential project in Pune. The project is construction of one residential building and is scheduled to complete in 12 months. The study is being conducted on various factors that were causing the delay in project.

Key words: Delay Analysis, GST Effect on Construction Industry, RERA Effect on Construction Industry, Demonetization Effect on Construction Industry

I. INTRODUCTION

Delays are one of the biggest problems construction firms face. Delays can lead to many negative effects such as lawsuits between owners and contractors, increased costs, loss of productivity and revenue, and contract termination. According to Bordoli and Baldwin (1998) and the World Bank (1990), for 1627 projects completed worldwide between 1974 and 1988.

The project delay in the construction industry affects not only the construction industry but the overall economy of a country as well. Project delay involves manifold issues, these issues concern right to recuperate costs of the project delay or the need to extend the project with the substantial right to recovery costs for adjustments to the contract schedules. One of the main objectives and policies of any public or private sectors dealing with the implementation of project is to enhance the projects performance process, through reduction of costs, completion of the construction project within their contract sum and time limit and improve quality. When project delays are unexpected, they are hardly manageable and have rather negative impacts on the project activities and outcomes. An unexpected delay will extends the overall duration of project activities and imposes an increase in project costs. It produces time-associated cost effects that will increase the resource consumption and will require extra time upon reaching project success. Delays in construction projects raise the displeasure to all the parties involved. The main role of the project manager is to make sure that the projects are completed within the estimated time and cost. The main purpose of this study is to identify the

factors of delays and their effects on project completion. This study takes an integrated approach and attempts to analyze the effect of specific causes with specific effects.

II. LITERATURE REVIEW

In the previous study and researcher contribute on the delay analysis is to find out actual causes of the delay, types of the delay and how to reduced it on the basis of case studies and variable methodologies like Relative index and by proper planning by using the Microsoft project software or any software.

Like Alena vasilyeva-Iyulina "delay analysis for construction projects: Classification of existing methods" (C1-3-182 Kyoto-daigaku-katsura, Nishikyo-ku, Kyoto 615-8540 Japan. says that the Besides these factors, like availability and quality of information, the main problem with current delay analysis techniques and a reason to call it a "dark art" is that delay analysis is fraught with manipulations. Applying the same facts to different methodologies results in different allocations between excusable and inexcusable delay. Moreover applying the same facts to same technique in different order may lead to contradictory conclusions.

Aditi Dinakar " Delay analysis in construction project " ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 4, Issue 5, May 2014) contributed that the The responses collected from the respondents make it evident that almost all parties' holds nearly equal responsibility for the delays in project.

The majority of people rated improper communication between the involved parties as the major problem while external reasons like lack of qualified labor, equipment and material when needed comes next in row. After analyzing the data it is clear that the contribution of Contractor in delay of the construction project is more than the client and consultant side. And the external factors contribute the least in delay of construction project.

III. OBJECTIVE

- 1) To study the impact of delay.
- 2) To find out impact of Demonetization, GST, and RERA on construction project with the help of questionaries'
- 3) To analyze schedule of construction project by using MSP software.
- 4) Some measures to avoid delay occurred in construction project.

IV. PROJECT METHODOLOGY

The actual delay reasons and causes need to be identified, the delay is directly changes the cost of the project and impact of the delay may be become very serious obstacle for the management. Construction industry is growing continuously with new rules and regulation. Need to analyze practical impact of new rules and regulation on behalf of construction

Management Company. The conventional delay is occurred due to the various causes, but in this paper we are going to study the delay which is caused by changing the laws (RERA, GST) by government and due to demonetization, what type of impact is observed.

A. Survey 1: Market Survey

(within Pune, state).

The survey is conducted for the basic analysis of material and process management software implementation.

B. Survey 2: Impact of GST, RERA and Demonetization and other problem analysis.

(Public, private or both)

To find out the actual causes of delay in the construction industry need to take interview and to take suggestions from the industrial experts, builder, contractor and site engineer. This survey is conducted with the some sample questionnaires on the basis of problem statements in the construction industry. Table No.4.1 Questionnaires for Relative Index method.

Sr. No.	Factors Affecting	Highly Affects	Somewhat Affects	Does not affect	Not applicable
1	RERA Impact				
2	Demonetization Impact				
3	GST				
4	Material Problem				
5	Customer Payment				
6	Communication between site management and labour				
7	Skilled Labour Problem				
8	Expectations out of labour performance				
9	Unscheduled extra work				
10	Scheduling of work				

C. Survey 3: Site Survey

Without practical analysis the study is incomplete so, we observed the few commercial, residential, and industrial sites where the site is incomplete due to various causes.

D. Case Study

The overall site planning and site survey with the based planned management to actual implementation, to find out the actual causes and other things which affect the implementation of the site.

Site Name: Dwaraka Residencies
Developer Name : Kalpavriksha Builders
Site Address: Sr No 96, jay Malhar colony, Ghule wasti , Manjri Bk. Pune – 412307
Office : Sharada Developers , Nr Krishnai Petrol Pump, Majari Keshavnagar Road, Manjari Bk. Pune - 412 307

V. RESULT

A. Survey 1 report:

The survey is conducted for the basic analysis of material and process management software implementation

Sr. No.	Company	Material management Process
1	Patil Associates	Software (HIT)
2	Balaji Developers	Manual
3	Naiknavare Developers.	Software(ERP)
4	Moraya Developers	Manual
5	Sidhhi Developers	Manual
6	Citispac Builders	Manual
7	Sai Developers	Manual
8	City Corporation Ltd. Amanora Park Town	Software(SAP)
9	Rahul Developers	Manual
10	Mate Patil Developers	Manual
11	Sharada Developers	Manual

Table 5.1: Survey Chart (Material Management/Project Management Survey Data)

In this survey the more than 80% construction industry does not used the management software, they are preferred the manual operations.

B. Survey 2: Report

Relative Index II

As per the problem facing in the industry, the questionnaires are prepared from the basic analysis and some delay causes research paper. Also added the GST, RERA and Demonetization impact of the industry

Relative Importance Index (RII) –

$$RII = \sum W / A \times N$$

W =Weighting given to each factor by respondents

A = Highest weight age is 4

N = Total number of respondent are 15

4= highly affects

3= somewhat affect

2= does not affect

1= not applicable

Factor No	1	2	3	4	5	6	7	8	9	10
Site Name										
Vrunda Residencies	3	4	3	3	2	2	2	2	2	2
Elena Homes	3	3	3	2	2	2	3	3	3	2

Infinity Towers	3	2	3	2	3	2	2	2	2	2
Balaji Sneh Aangan	3	4	3	3	3	2	3	2	3	2
Silver Palm Grave	4	3	4	2	3	1	3	2	3	1
Santosh dreams	4	4	4	3	3	4	3	2	3	3
Sai Platina	3	4	3	2	2	3	1	3	2	2
Ranjan heights	3	4	4	4	4	2	3	3	3	3
Alliance aishvarya	3	3	4	4	3	3	3	2	3	3
Aishvarya Residences	4	3	3	2	4	3	3	3	2	2
Total	33	34	34	27	29	24	26	24	26	22

Table No: 5.2 Responses collected during survey
A = 4 and N = 10

Σ W	33	34	34	27	29	24	26	24	26	22
A x N	40	40	40	40	40	40	40	40	40	40
Index	0.9	0.925	0.95	0.7	0.8	0.6	0.75	0.6	0.75	0.6

C. Sample RII on Delay Causes

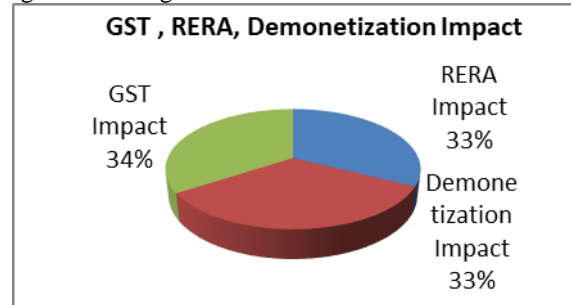
As per the above relative index calculations and survey the effect of GST, RERA and Demonetization on the construction industry is high as compared to the other problem the total number of participants is 10. As per the interviewing with the Site engineer and developers the impact of Demonetization and RERA, GST the sequence is unbalance the financial management and directly on the business

Sr. No.	Relative Importance Index (RII) Factors	Not applicable	
		Index	Rank
1	RERA Impact	0.9	3
2	Demonetization Impact	0.925	2
3	GST Impact	0.95	1
4	Material Problem	0.775	5
5	Customer Payment	0.825	4
6	Communication between site management and labour	0.625	9
7	Skilled Labour Problem	0.7	6
8	Lack of high technology in mechanical	0.675	8
9	Labour Problem	0.7	7
10	Climatic condition	0.6	10

Table 5.3: Relative Index II

Construction and real estate has been a booming sector in India, which is facing a major slowdown in the aftermath of demonetisation. It has always been a sector

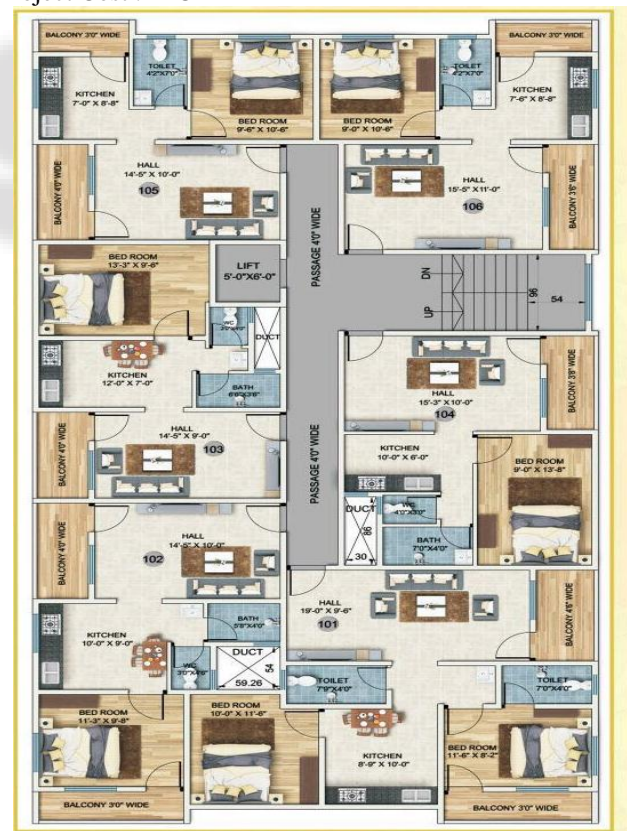
riddled with litigation owing to multiplicity of taxes and dual administration mechanism; thereby exposing it to the conundrums of both Central and State levies. Currently, certain activities in this sector command a cumulative tax levy on effectively 140% of the actual transaction value owing to cascading effect



D. Case study for the Microsoft project (MSP)

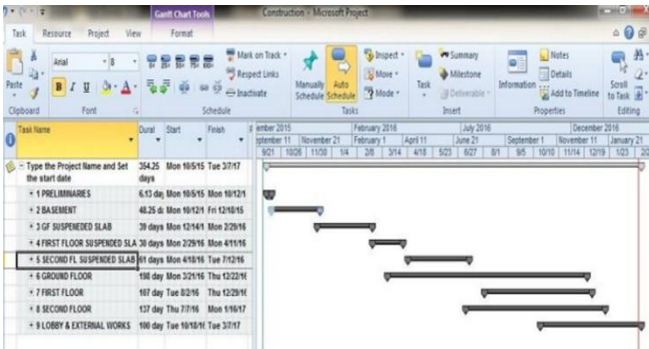
1) Case Study:

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Office : Sharada Developers , Nr Krishnai Petrol Pump, Majari Keshavnagar Road, Manjari Bk. Pune - 412 307
Project Scheduled for 12 Month
Project Cost :12 Cr

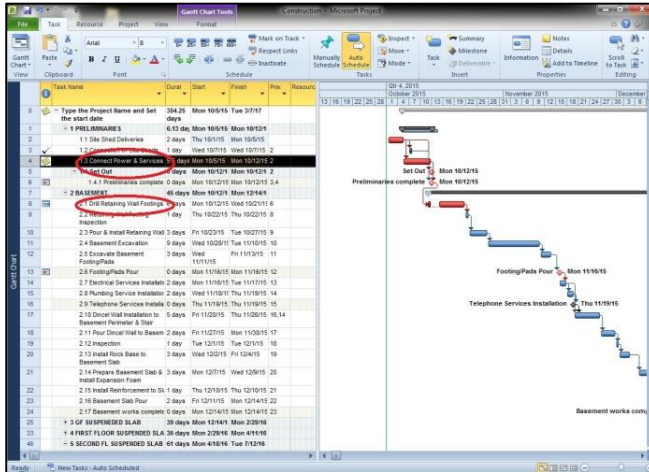


Floor Plan

Fig. 5.4.1: As Planned Scheduled



5.4.2 Delay in Power connection and electrical services



The delay in the power connection is occurred due to the criteria of min 45 days for the approval. As a calculated, the delay is occurred from the (MSEDCL) which is 2 Days and other necessary distribution points and installation. As a mentioned in the Diagram.

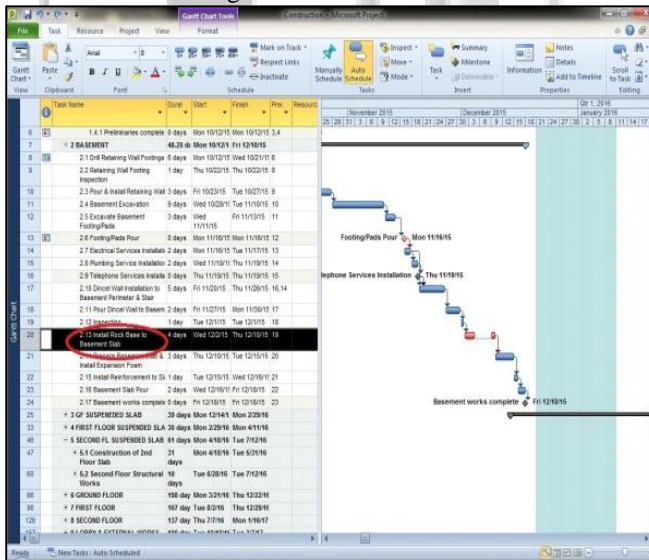


Fig No: 4.3.3 Delay occurred at initial stage

This method measures the impact of the delays on the contractor's as-planned CPM schedule. The various delays are formulated as activities and added to the as-planned network in a chronological order showing the effect of each delay at a time and demonstrating how the project is being delayed. The amount of delay equals the difference in completion dates between the schedules before and after the impacts. The technique can be used for analysis of delay

during and after project completion. Delay analysis of the sample project using this technique was carried out by sequential addition of the delays to the as-planned schedule.

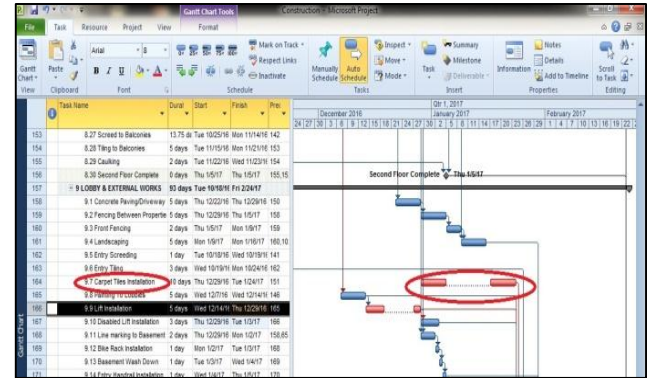


Fig. 5.4.4: Delay due to demonetization

The carpet and Tiles installation and Painting delay occurs due to the choice factor and finalizing the tiles and carpet design/ colour combinations and different choices. This delay is considered as per the planned designed.

Carpet Tiles installation ET= 10 days Actual Req = 30+ days
 Estimated Starting Date : 05 Nov 2016
 Actual Starting date : 29 Dec 2016
 Finished date : 24 Jan 2017
 Date of RERA, GST, and Demonetization apply:
 – Demonetization date : 8 Nov 2016
 – MahaRera date : 1 May 2017
 GST date : 1 April 2017

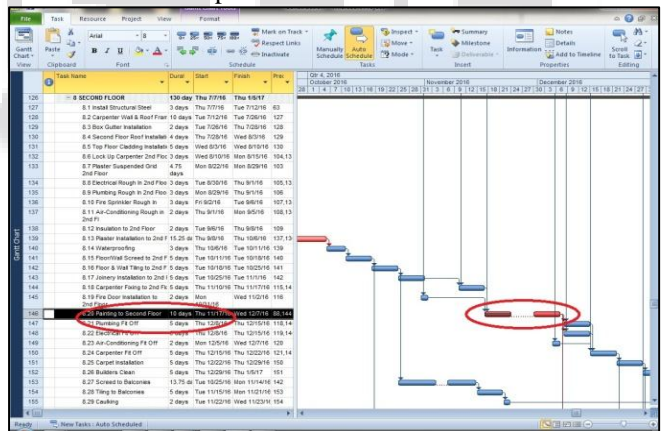


Fig No:4.3.3 Impact of delay due to demonetization

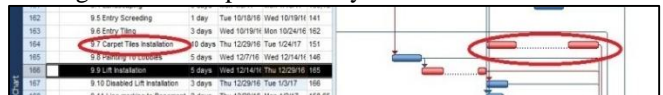


Fig. 4.3.4: Delay due to demonetization

At the end of the project completion, the Carpet and Tiles installation required more time as per the predefined scheduled. The estimated time is 10 days but actual time required for the implementation which goes to more than 30 days. The basic reason of this case is the demonetization.

The labour payment is 90% is in cash so the management failed to transit the payment in cash to labour. In the demonetization, the banking or payment mode was not flexible and reliable.

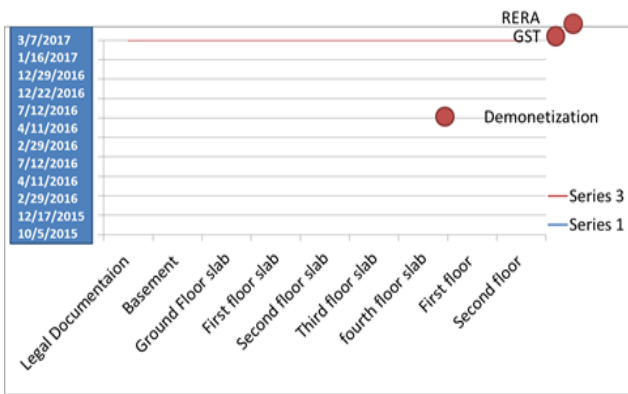


Fig. 4.4.5: Actual impact on site

E. Impact of Demonetization

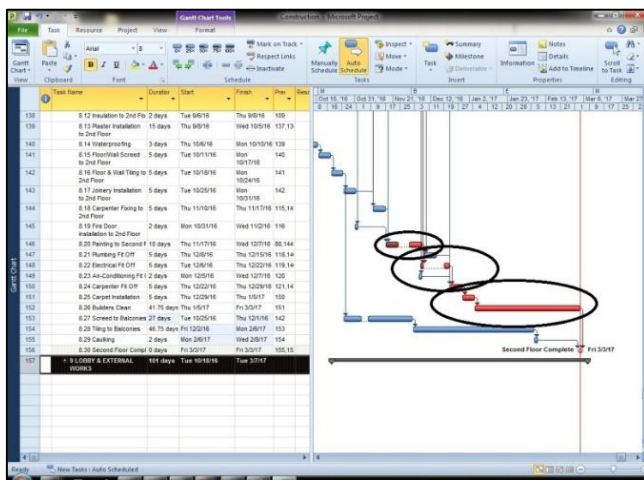


Fig. 4.4.6: Impact of Demonetization

As per the Demonetization on dated 8th Nov 2016 and as per above planned in the November 2016 after the 15th the several barrier occurs due to the demonetization and cash crunch, The amount of cash required to run system which is not available

VI. CONCLUSION

As per the various survey and interviewing and questioning to the builder/ participant the impact of GST, RERA and Demonetization is high.

- The responses collected from the respondents make it evident that almost all parties' holds nearly equal responsibility for the delays in project.
- The majority of people rated improper communication between the involved parties as the major problem while external reasons like lack of qualified labor, equipment and material when needed comes next in row. After analyzing the data it is clear that the contribution of Contractor in delay of the construction project is more than the client and consultant side. And the external factors contribute the least in delay of construction project.
- The implementation of Demonetization and GST has directly affected.
- The material supply chain will need to establish by management.
- Although the CPM method has been widely used for scheduling construction projects, it nevertheless fails to

deliver structured decision support for projects. Despite the simplicity of CPM calculations, CPM schedules are difficult to analyze because of many well-documented factors, including the use of complex relationships, mid-activity critical-path fluctuation, and errors in float calculation. CPM also has no formulation that can account for multiple project constraints, such as deadline and resource limits. These factors have an impact on the accuracy and repeatability of CPM calculations and hinder the use of CPM as a decision support tool for corrective actions and delay analysis.

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REFERENCES

- [1] Anil Upadhyay1, Vaishant Gupta2, Dr. Mukesh Pandey3 "a case study on schedule delay analysis in construction projects in gwalior" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 - 0056 p-ISSN: 2395-0072
- [2] Alena vasilyeva-lyulina "delay analysis for construction projects: Classification of existing methods" (C1-3-182 Kyoto-daigaku-katsura, Nishikyo-ku, Kyoto 615-8540 Japan.
- [3] Aditi Dinakar " Delay analysis in construction project " ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 4, Issue 5, May 2014).
- [4] Alena Vasilyeva-Lyulina1, Masamitsu Onishi2 and Kiyoshi Kobayashi3 "Delay Analysis Methods for Construction Projects: Mathematical Modelling" International Journal of Transportation Vol.3, No.1 (2015), pp.27-36.
- [5] Frank J. Arcuri ,John C. Hildreth ,Virginia Tech " The Principles of Schedule Impact Analysis".
- [6] Jyh-Bin Yang1*, Kuei-Mei Huang2, Chang-Hung Lee3, and Sheue-Meei Chen3 "DELAY IMPACT ANALYSIS METHOD FOR LOST PRODUCTIVITY".
- [7] Jyh-Bin Yang*,1 and Chih-Kuei Kao "Review of Delay Analysis Methods: A Process Based Comparison" The Open Construction and Building Technology Journal, 2009, 3, 81-89
- [8] Ms. Leena Mali1, Mr. A. A. Warudkar2 " Causes of Delay in the Construction Industry in Pune region of India" International Journal of Application or Innovation in Engineering & Management (IJAIEEM) Volume 5, Issue 5, May 2016 Volume 5, Issue 5, May 2016 ISSN 2319 – 4847
- [9] Ar. Meena. V , Ar. K. Suresh Babu " Study on Time Delay Analysis for Construction Project Delay Analysis" International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 IJERTV4IS031166 www.ijert.org (This work is licensed

under a Creative Commons Attribution 4.0 International License.) Vol. 4 Issue 03, March-2015

- [10] Nuhu Braimah "Construction Delay Analysis Techniques—A Review of Application Issues and Improvement Needs" Published: 23 July 2013 ISSN 2075-5309

