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Factors controlling scheduling of construction projects

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ABSTRACT

The occurrence of a delay in the construction project is a common problem in civil engineering. There is an increase in the number of construction projects experiencing extensive delays leading to exceeding the initial time and cost budget. The delay is a situation where the actual progress of a construction project is slower than the planned schedule. This paper presents a major construction delay caused by rank order retrieved from past literature by analyzing several negative effects. Even though over the years, existing Delay Analysis Techniques (DATs) for aiding this decision-making have been helpful but have not succeeded in curbing the high incidence of disputes associated with delay claims resolutions and a major source of the disputes lies with the limitations and capabilities of the techniques in their practical use. Developing a good knowledge of these aspects of the techniques is of paramount importance in understanding the real problematic issues involved and their improvement needs. So analyzing all the data's over a decade this paper seeks to develop such knowledge and understanding. Thus this paper presents a major construction delay caused by rank order retrieved from past literature. It is followed by collecting a list of factors that cause the delay in a construction project. The collected factors are analyzed categorized into groups with ranking. A scheduling model of the apartment building is developed using MS-Project. To develop delay factors influencing in the model. As a result, the comparison between actual schedule progress and factors influencing the schedule are determined. From the study, the unforced delay is identified, so that that delay can be considered in the developing of any future construction scheduling work.

Keywords *— Delay, Construction projects, Factors causes delay*

1. INTRODUCTION

In India, construction industries face many problems in that delay in the project are a major and common problem in all over the industry. Delay is defined as time overrun either beyond the completion date specified in a contract or beyond that the parties agree upon for delivery of a project. It is lapping over of planned schedule and is considered as a common problem in the construction project. The delay in construction project affects the company performance and overall economy of the country as well. construction project accomplished 70% of time overruns and 76% of contractors and 56% of consultants have identified that they face average time overrun of 10%-30% from an original period that causes 50% cost overrun.

A project is now thought of as a cluster of activates interrelated, which could embody a task of specialist and specialized work deception the information and talented men out there to be order taken in most systematic manners. These involve the adoption of techniques are applied to project management. In the construction industry, contractors tend to maximize their profit for market growth. To achieve this aim, it is crucial for contractors to carefully describe the factors that affect the success of the project and estimate their impact before bidding stage.

The projects may differ in scale size, a period of project, goals, uncertainty, complexity, pace and some other dimensions. The delay means incompletion of the project within the specified period of time agreed upon in the contract. It is widely endorsed that construction project scheduling plays a key role in project management due to its influence on project success.

Delays in the various project are common and cause considerable losses to projectors. The literature has identified several factors causing a delay in a construction project in domestic and all over the world in numerous manners of decades. The problem studied in different countries with different scholars, due to the reason that it differs from one country to another, in time variation or even one project to another. And to find the various factors and groups of factors that caused a delay. The causes of delay in the construction process, which comprises pre-construction, construction, and post-construction.

Typically, the work offers a low rate of return in relation to the amount of risk involved when the delay causes effects on the construction project. So it is essential to define the actual causes of delay in order to minimize and avoid the early in any construction project. The following section represents the literature review, methodology, result in ranking and discussions and conclusion.

2. LITERATURE REVIEW

Several studies have been carried out to determine the causes of delay in a construction project.

Betty W.Y.Chiu (2017): A review of key electrical construction factors in Hong Kong. A study was conducted in Hong Kong, where these projects find critical activities. In bridging this knowledge gap the study found that 56 delay factors, belonging to 10 groups are formed as a questionnaire survey and passed to professional parties. As a result, the study of the cause of delay was done and with scheduling, the factors delay are controlled.

Chidambaram Ramanathan (2012): A critical review of construction delay causing risk on time and cost. A comparison study is made from the collected literature review and questionnaire survey by standard deviation, variances, weighted average, and relative important index. These studies have identified 113 factors classified into 18 groups responsible for the delay. As a result, the comparison revealed the ranking given by all the researchers. These ranks are compared for better understanding.

Ghulam Abbas Niazai (2013): Reported a project delay is less than 12 months highly contributes. The paper found 83 causes of delay and with a major point, they concluded that two causes of delay are common between all parties, which are corruption and security. Stakeholders face Poor security is the most difficult challenges in the construction project, which delays the project and increase the cost. In Afghanistan, corruption is a serious threat which significantly affects the project.

Desai Megha (2013): Paper discusses the methodology for ranking of causes of delay for residential construction projects in India context. From the various literature review, 9 major groups are classified. Relative importance index and important index as a function of frequency index and severity index. Based on these techniques a questionnaire is prepared and major causes of delay were found.

Dinesh Kumar R (2016): Presented causes and effect of delay in an Indian construction project. The main aim of this paper is to identify the significant delay causes in the construction industry. From the questionnaire survey conducted by the Indian construction industry, the top 20 significant factors with respect to Indian context is found out. Finally, recommendations are given to avoid delay in the construction project.

Frank D.K. Fugar (2010): A study focused on the delay of construction of a building project in Ghana. About 32 factors were categorized into 9 groups and ranked by relative important index method. As a result, the financing group of delay factors was considered as the most influential factors and the material factors as second factors, followed by scheduling and controlling factors.

Leena Mali (2016): Paper was an attempt to study on causes of delay in the construction industry in Pune region of India. The paper reveals about the delay, type of delay, causes and effect of the delay. From the former literature review and survey, the cause of delay is categorized and from the questionnaire of this paper is prepared. The respond rating gives the causes of delay in a construction project.

Marine Hamzah (2011): Presented the cause of construction delay by a theoretical framework in Malaysia construction projects. From a review of three journal paper, the author shows the improvement of delay factors and the factors perspective on project management. As a result, a deep study on positive and negative effect are determined and suggested for future study of the project to the critical framework.

Mohamed M. Marzouk (2014): Presented analyzing delay causes in Egyptian construction projects. This paper mainly focuses on the Egyptian construction project delay. A questionnaire survey was disturbed to a construction expert and obtained their feedback. Frequency index, severity index, and important index are evaluated to value top ten delay causes. Statistical analysis is carried out using the ANOVA method to test delay causes in the Egypt construction project. As a result, most delay causes are leveled significantly in five categories.

Murat Gunduz (2013): Paper is to identify delay factors on construction projects and analyze these factors with the relative important index method. About 83 different delay factors are found, grouped into nine major groups and visualized by lshikawa (Fishbone) diagram through detailed literature review and interviews. As a result, most important delays are ranked and discussed with some recommendation.

Owolabi James D (2014): The paper aim is to investigate the causes and effects of delay on building construction project delivery time. Factors that induce delay are limited to 15 factors causing delay and they are ranked according to the mean index score. The result formulated from the questionnaire survey were experienced at least 10 years. As a result, the major causes were found to 51.1% client, 35.5% contractors and 13.3% of a consultant. The effects were also discussed in the session, where time and cost plays major as a result.

K. Rajkumar (2016): Carried out an empirical study of factors affecting the construction delay. This study was made in India, where the delay in the project was found high. The study reveals that 70% of a project undertaken by government departments and agencies were delivered late and recent research by Building Cost Information Services (BCIS) found that nearly 40% of all studied project had overrun the contract period. As a result of this study causes and recommends for delay factors will help the company to develop its economy rate.

Remon Fayek Aziz (2013): The paper was to improve delay control in an Egypt construction project, which determines the influence ranks of ninety-nine (99) factors causing a delay. Under 9 primary categories, the factors were explored. The result was compared by studying all participants to cope with all factors causing a delay in construction projects in Egypt. The factors are grouped and ranked by computed with relative importance indices (RI). As a result, most and least important factors and groups were achieved through ranking results.

Tsegay Gebrehiwet (2017): Carried out a survey analysis of delay impact on construction project based on RII and correlation coefficient an empirical study. The comparison between three construction stages such that owner, contractor, and consultant were ranked. As a result, the topmost important causes of delay in the Ethiopian construction project identified. The research gives the major causes and effect delay in the Ethiopian construction projects based on the construction process.

Shabbas Al Hammadi (2016): Carried out a study of delay factors in construction projects. A survey was conducted in Saudi Arabia to determine the exact factors responsible for a project delay. This was achieved by critical analysis of the literature review and questionnaire survey. From delay weight, position and ages five critical factors of delay in a construction project. From a comparative study of delay rank, most influential groups are discussed.

Suhas G. Awari (2016): Carried out the analysis for case identification for delays in building construction industry. A case study on Mumbai construction project delay is carried out to find the delay factors in the building. From the literature and questionnaire, 51 causes of delay in 8 different groups were. Using the relative important index method the cause of the delay of the project is outlined. As a result, the effect is discussed and a solution to overcome that delay.

Suhas G. Awari (2016): Presented identifying the cause of delay in the construction industry in Mumbai region. This paper mainly focuses on the method and causes of delay to minimize the delay in construction projects in Navi Mumbai. From the interview and literature, about 52 causes of delay in 8 different categories were evaluated. From collected data delay happen due to mistakes in the design document, delay in contract payment, slow decision making, private project contractor's payment by the owner, shortage of material, labour & equipment.

Umesh Pawar (2017): Presented delay analysis in the residential project by using a case study. This article represents the basic analysis of delay. The data collected was found through qualitative and quantitative methods. The questionnaire survey was divided into three parts and result obtains through that gives causes of delay.

3. DISCUSSION

Although different researchers from different area study the caused delay in a construction project, some of the explored delay causes are similar. So, based on different literature study many delay causes were placed under different groups with their different subgroups. The main groups of delay and their sub-groups like Owner related Consultant related Consultant related, Contractor related, Material related, Labor and equipment related, Project related, Design related, Externally related are categorized and discussed in a detailed manner in the below as follow table, in construction projects are as follows

Table 1: Causes of delay

S.no	Causes of delay	Category
1	Financial problem (delayed payments, financial difficulties and economic problems)	Owner related
2	Slowness in decision-making process	
3	Delay to furnish and deliver the site to the contractor	
4	Late in revising and approving design document by owner	
5	Change orders by the owner during construction	
6	Unavailable of incentives for contractors for finishing ahead of schedule	
7	Delay in approving shop drawing and sample material	
8	Suspension of work	
9	Poor site management and supervision	Contractor related
10	Rework due to errors during construction	
11	Inadequate contractor experience	
12	Inadequate planning and scheduling	
13	Construction methods	
14	Long waiting time for approval of test samples of material	
15	Difficulties in financing project by the contractor	
16	Delay by subcontractors	
17	Legal disputes	
18	Poor communication and coordination between the parties and others.	Consultant related
19	Inadequate experience of consultant	
20	Late in reviewing and approving design document by consultant	
21	Conflicts between consultant and design engineer	
22	Inflexibility of consultant	
23	Late delivery of material	Material related
24	Change in type and Spec.	
25	Fluctuation/Escalation of prices	
26	Delay in special manufacturer from a foreign country (Imported)	
27	Shortages of materials on site or market	

28	Material procurement	
29	Damage in storage while needed at the site	Labour and equipment related
30	Unqualified/unskilled workforce	
31	Equipment failure or breakdown	
32	Low productivity and efficiency of the equipment	
33	Shortage of equipment	
34	Shortage of labors	
35	Labor disputes and strikes	
36	Unskilled equipment operators	
37	The low productivity level of labors	
38	Impractical design	Project related
39	Unrealistic contract durations imposed by the client	
40	Accidents during construction	
41	Effect of subsurface condition (e.g. soil, high water table, etc.)	
42	Ineffective delay penalties	
43	Traffic control regulation practised at the site	
44	Insufficient available utilities on site(e.g water)	
45	Type of contract, bidding and award.	
46	Incompetence project team	
47	Mistakes and discrepancies in the design	Design related
48	Delay in producing a design document	
49	Mistakes in soil investigation	
50	Insufficient data collection and survey before the design	
51	Misunderstanding of owner's requirements by design engineer	
52	The complexity of project design	
53	Poor management skill	
54	Inadequate design team experience	
55	Un-use of advanced engineering design software	
56	Design changes made by designers	
57	Bad weather condition	External related
58	Delays in obtaining a permit from the municipality	
59	Changes in government regulations and laws	
60	Natural disasters (flood, landslides, …)	
61	Delay in performing final inspection and certification by a third party	
62	The social and cultural factor	
63	Corruption	

After finding the major cause of delay a detail of the major cause of delay, a schedule model of the apartment building was created using MS-project. The following procedure gives to form schedule with delay factors.

- The case study has been designed and simulated with various delay scenarios and critically evaluated the existing techniques and various delay models are obtained.
- The individual impact of each delay model on the project completion is made to consideration. All delays, including delays on the non-critical path, were summed up and their net effect calculated and made a detailed comparison.
- The finally most successful delay model is formed and all the delay factors are ranked by bringing in various success ratio to consideration and complete ranking on schedule is made.

Table 2: Actual schedule of earthwork

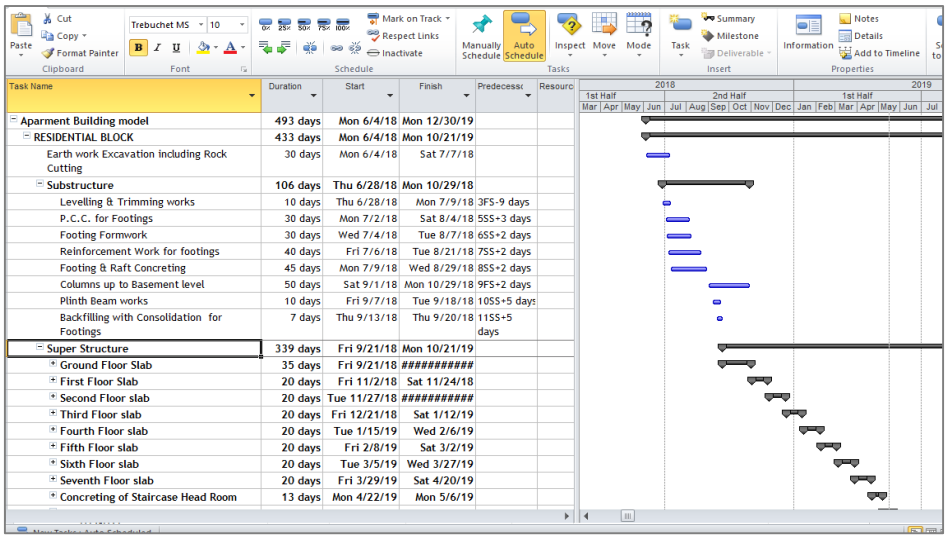
S.no	Activity	Duration	Starting date	Ending date
1	Apartment Building Model			
2	-Residential Building Block			
3	Earthwork excavation including rock cutting	30 D	5/9/2018	7/10/2018

To complete this activity in 30 days we are in need of earthwork equipment like power shovel exactor and tipper lorry. And the quantity of machine required is 2nos of power shovel and 6nos of tipper lorry. The work has to be carried out for 10hr. A detailed schedule of earthwork is given above with factors consideration of delay causes. For our comparison lets, we consider external factor –bad weather condition and unfavorable site condition for 5 days that take place in the site. This delay can be avoided by increasing the working hours in site. That is the 10hr work should be carried out for 14hrs a day.

Table 3: Detail schedule model of earthwork

S.no	Activity	Duration	Starting date	Ending date
1	Apartment building model			
2	-Residential Building Block			
3	Earthwork excavation including rock cutting	35 D	5/9/2018	7//2018
4	Earthwork mass cutting level(upto 1.5m)	10 D	6/4/2018	6/16/2018
5	Earthwork below mass cutting level(1.5 to 3m)	12 D	6/17/2018	6/26/2018
6	Earthwork below mass cutting level(3 to 4.5m)	13 D	6/24/2018	7/12/2018

The figure shows the actual schedule of the apartment building. The table gives their detail schedule in table format.



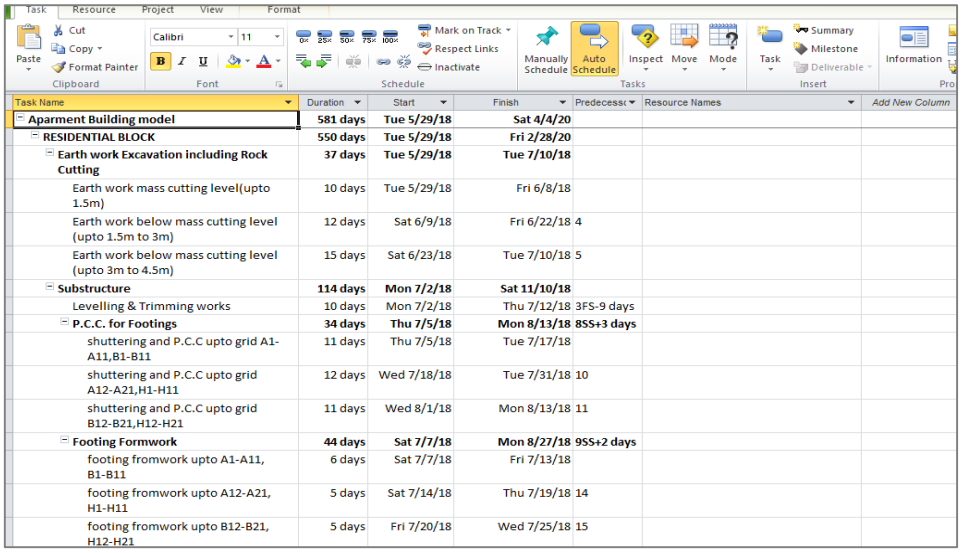
Task Name	Duration	Start	Finish	Predecessors	Resource
Aparment Building model	493 days	Mon 6/4/18	Mon 12/30/19		
RESIDENTIAL BLOCK	433 days	Mon 6/4/18	Mon 10/21/19		
Earth work Excavation including Rock Cutting	30 days	Mon 6/4/18	Sat 7/7/18		
Substructure	106 days	Thu 6/28/18	Mon 10/29/18		
Levelling & Trimming works	10 days	Thu 6/28/18	Mon 7/9/18	3FS-9 days	
P.C.C. for Footings	30 days	Mon 7/2/18	Sat 8/4/18	5SS+3 days	
Footing Formwork	30 days	Wed 7/4/18	Tue 8/7/18	6SS+2 days	
Reinforcement Work for footings	40 days	Fri 7/6/18	Tue 8/21/18	7SS+2 days	
Footing & Raft Concreting	45 days	Mon 7/9/18	Wed 8/29/18	8SS+2 days	
Columns up to Basement level	50 days	Sat 9/1/18	Mon 10/29/18	9FS+2 days	
Plinth Beam works	10 days	Fri 9/7/18	Tue 9/18/18	10SS+5 days	
Backfilling with Consolidation for Footings	7 days	Thu 9/13/18	Thu 9/20/18	11SS+5 days	
Super Structure	339 days	Fri 9/21/18	Mon 10/21/19		
Ground Floor Slab	35 days	Fri 9/21/18	##########		
First Floor Slab	20 days	Fri 11/2/18	Sat 11/24/18		
Second Floor slab	20 days	Tue 11/27/18	##########		
Third Floor slab	20 days	Fri 12/21/18	Sat 1/12/19		
Fourth Floor slab	20 days	Tue 1/15/19	Wed 2/6/19		
Fifth Floor slab	20 days	Fri 2/8/19	Sat 3/2/19		
Sixth Floor slab	20 days	Tue 3/5/19	Wed 3/27/19		
Seventh Floor slab	20 days	Fri 3/29/19	Sat 4/20/19		
Concreting of Staircase Head Room	13 days	Mon 4/22/19	Mon 5/6/19		

Fig. 1: Actual schedule of substructure

Table 4: Actual schedule of substructure

S.no	Activity	Duration	Starting date	Ending date	Predecessor
1	Apartment building model				
2	-Residential building block				
3	Earthwork excavation including rock cutting	30 D	6/4/2018	7/7/2018	
4	-substructure	106 D	6/28/208	10/29/2018	
5	Leveling and trimming work	10	6/28/2018	7/9/2018	3FS+9D
6	P.C.C for footing	30	7/2/2018	8/4/2018	5SS+3D
7	Footing formwork	30	7/4/2018	8/7/2018	6SS+2D
8	Reinforcement work for footing	40	7/6/2018	8/21/2018	7SS+2D
9	Footing and rafting concreting	45	7/9/2018	8/29/2018	8SS+2D
10	Column upto basement level	50	9/1/2018	10/29/2018	9FS+2D
11	Plinth beam works	10	9/7/2018	9/18/2018	10SS+5D
12	Backfilling consolidation work for footing	7	9/13/2018	9/20/2018	11SS+5D

To complete substructure activity the following sub-activity requires as given; Levelling and trimming work-Equipment need for levelling is dump level and for trimming, rock drill is used. About 20nos of the fitter and 20 helpers is needed to complete this work in a duration of 10 days. P.C.C for footing- 275m^3 is needed for footing, about 3nos of the fitter and 3 helpers is needed to complete this work in 30 days. Footing formwork- wooden formwork is done on the footing, about 4 helpers and 4nos of the fitter is required to complete in 30days. Reinforcement for footing- steel required for the footing is 18tons. About 3nos of the fitter and 3 helpers is a need for this. Footing and raft concreting- about 10 fitter and 10 helpers are required to complete this in 45 days. Column up to basement level- about 3 fitter and 3 helpers are required to this work in 50 days. Plinth beam work-steel required for plinth beam is 8 ton. About 2 fitter and 2 helpers are needed for this. Backfilling consolidation work for footing-1 power shovel and 3 tipper lorry is required to complete this activity in 7 days. A detailed schedule is given below with the delay factors consideration. Let us take owner related factors - Delay to furnish and deliver the site to the contractor and Change orders by the owner during construction as a delay which causes 35 days delays in the project. Figure 2 shows the delay factors schedule.



Task Name	Duration	Start	Finish	Predecessors	Resource Names
Aparment Building model	581 days	Tue 5/29/18	Sat 4/4/20		
RESIDENTIAL BLOCK	550 days	Tue 5/29/18	Fri 2/28/20		
Earth work Excavation including Rock Cutting	37 days	Tue 5/29/18	Tue 7/10/18		
Earth work mass cutting level(upto 1.5m)	10 days	Tue 5/29/18	Fri 6/8/18		
Earth work below mass cutting level (upto 1.5m to 3m)	12 days	Sat 6/9/18	Fri 6/22/18	4	
Earth work below mass cutting level (upto 3m to 4.5m)	15 days	Sat 6/23/18	Tue 7/10/18	5	
Substructure	114 days	Mon 7/2/18	Sat 11/10/18		
Levelling & Trimming works	10 days	Mon 7/2/18	Thu 7/12/18	3FS-9 days	
P.C.C. for Footings	34 days	Thu 7/5/18	Mon 8/13/18	8SS+3 days	
shuttering and P.C.C upto grid A1-A11,B1-B11	11 days	Thu 7/5/18	Tue 7/17/18		
shuttering and P.C.C upto grid A12-A21,H1-H11	12 days	Wed 7/18/18	Tue 7/31/18	10	
shuttering and P.C.C upto grid B12-B21,H12-H21	11 days	Wed 8/1/18	Mon 8/13/18	11	
Footing Formwork	44 days	Sat 7/7/18	Mon 8/27/18	9SS+2 days	
footing fromwork upto A1-A11, B1-B11	6 days	Sat 7/7/18	Fri 7/13/18		
footing fromwork upto A12-A21, H1-H11	5 days	Sat 7/14/18	Thu 7/19/18	14	
footing fromwork upto B12-B21, H12-H21	5 days	Fri 7/20/18	Wed 7/25/18	15	

Fig. 2: Delay schedule model of sub-structure

Table 4: Detail schedule model of substructure

S.no	Activity	Duration	Starting date	Ending date	Predecessor
1	Apartment Building Model				
2	-Residential Building Block				
3	-Earthwork excavation including rock cutting	30 D	6/4/2018	7/7/2018	
4	Earthwork mass cutting level(upto 1.5m)	10 D	6/4/2018	6/16/2018	
5	Earthwork below mass cutting level(1.5 to 3m)	12 D	6/17/2018	6/26/2018	
6	Earthwork below mass cutting level(3 to 4.5m)	13 D	6/24/2018	7/12/2018	
7	-SUBSTRUCTURE	114 D	7/2/208	11/10/2018	
8	Leveling and trimming work	10	7/2/2018	7/12/2018	3FS-9D
9	-P.C.C for footing	34	7/5/2018	8/13/2018	8SS+3D
10	Shuttering and P.C.C upto grid A1-A11, B1-B11.	11	7/5/2018	7/17/2018	
11	Shuttering and P.C.C upto grid A12-A21, H1-H11.	12	7/18/018	7/31/2018	10
12	Shuttering and P.C.C upto grid B12-B21, B12-B21.	11	8/1/2018	8/13/2018	11
13	-Footing formwork	44	7/7/2018	8/27/2018	9SS+2D
14	Footing formwork upto A1-A11, B1-B11	6	7/7/2018	7/13/2018	
15	Footing formwork upto A12-A21,H1-H11	5	7/14/2018	7/19/2018	14
16	Footing formwork upto B12-B21,H12-H21	5	7/20/2018	7/25/2018	15
17	Pedestal formwork upto A1-A11,B1-B11	8	7/26/2018	8/3/2018	16
18	Pedestal formwork upto A12-A21,H1-H11	10	8/4/2018	8/15/2018	17
19	Pedestal formwork upto B12-B21,H12-H21	10	8/16/2018	8/27/2018	18
20	-Reinforcement work for footing	45	7/10/2018	8/30/2018	13SS+2d
21	Bar bending work for footing	15	7/10/2018	7/26/2018	
22	Laying and leveling footing reinforcement upto A1-A11, B1-B11	10	7/27/2018	8/7/2018	21
23	Laying and leveling footing reinforcement upto A12-A21, H1-H11	12	8/8/2018	8/21/2018	22
24	Laying and leveling footing reinforcement up to B12-B21, H12-H21	8	8/22/2018	8/30/2018	23
25	-Footing and rafting concreting	50	7/13/2018	9/8/2018	20SS+2D
26	Footing concreting up to A1-A11, B1-B11	6	7/13/2018	7/19/2018	
27	Footing concreting upto A12-A21,H1-H11	6	7/20/2018	7/26/2018	27
28	Footing concreting upto B12-B21,H12-H21	7	7/27/2018	8/3/2018	28
29	Raft concreting upto A1-A11,B1-B11	9	8/4/2018	8/14/2018	29
30	Raft concreting upto A12-A21,H1-H11	11	8/15/2018	8/27/2018	30
31	Raft concreting upto B12-B21,H12-H21	11	8/28/2018	9/8/2018	31
32	-Column upto basement level	50	9/12/2018	11/8/2018	25FS+2D
33	Reinforcement and concreting column up to grid A1-A11, B1-B11	15	9/12/2018	9/28/2018	
34	Reinforcement and concreting column upto grid A12-A21,H1-H11	17	9/29/2018	10/18/201	33
35	Reinforcement and concreting column upto grid B12-B21,H12-H21	18	10/19/2018	11/8/2018	34
36	Plinth beam works	10	9/18/2018	9/28/2018	32SS+5D
37	Backfilling consolidation work for footing	7	9/24/2018	10/1/2018	36SS+5D

From the above table delay of this activity is found to be 8 days from the original schedule this can avoid by increasing in labour requirement. Similarly, for other activity, we can develop the schedule with delay factors.

4. COMPARISON AND RESULT

Delay claims are now a major source of conflict in the construction industry and also one of the most difficult to resolve. Inspired by this, academic researchers and practitioners alike an evaluation of the most common Data's are based on a case study, a discussion of the key relevant issues often not addressed by the techniques and their improvement needs. So the evaluation of the techniques confirmed that the various Data's give different allocations of delay responsibilities, although we had described delay of various projects in the introduction and found the various cause of delay. A delay in the project is usually an occurring one where that is not avoidable under several circumstances. Though it's inevitable some measurements from engineers, contract and consultant can be brought by detail study. Even Though there is a delay in the project is said success when its profits are high.

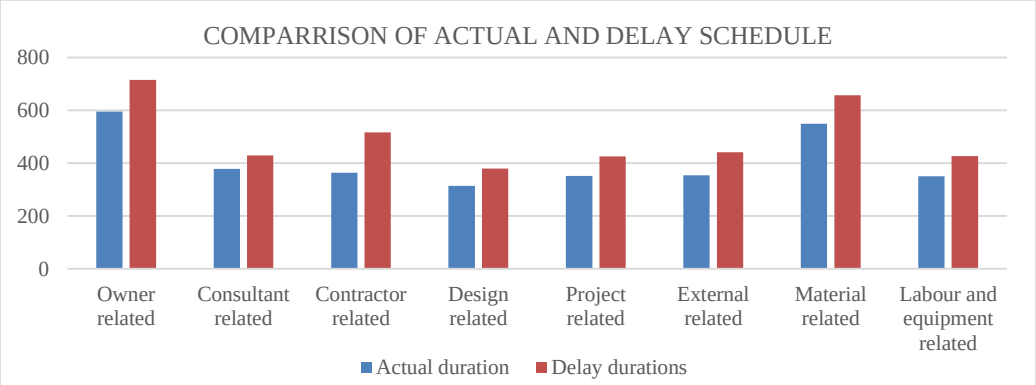


Fig. 3: Comparison between actual and delay durations

We made numerous attempts by way of developing Data and good practice analysis for guiding practitioners on the proper analyses and resolution of the claims. The knowledge of the application of these techniques is of paramount importance to understand their limitations and capabilities in practice and areas of improvement needs. As part of wider research work, this paper seeks to develop such knowledge and understanding via Graph.

5. CONCLUSION

To improve delay control in the construction project, the influence of main factors affecting it must be identified and recognized and treated after various studies. This research has identified the delay factors from various literature, Based on this study, We made numerous attempts by way of developing Data and good practice analysis for guiding practitioners on the proper analyses and resolution of the claims. The knowledge of the application of these techniques is of paramount importance to understand their limitations and capabilities in practice and areas of improvement needs and as a result we determined that there are total of 169 factors in that about 63 of the factors are considered mainly in the ranking process and they are divided into 8 main categories such as Owners, Consultants, Contractors, Materials, Labours and Equipment's, Design and Project related factors. The ranking is given as per the literature that is taken out and grouped in a manner to find the most common delay in a construction project. The delayed schedule is determined from the actual schedule and group of factored delay. A comparison of schedule that developed with actual and delay factors determine the result of project maximum delays occurs in the projects. As a result of our research, it's found 88 days is the maximum delay of the project.

6. REFERENCES

[1] Betty W.Y. CHIU, Joseph H.K. LAI (2017). "Project delay: key electrical construction factors in Hong Kong" Journal of Civil Engineering and Management 23(7), 847-857.
[2] Chidambaram Ramanathan, SP Narayanan and Arazi B Idrus (2012). "Construction delay causing risks on time and cost-a critical review" Australasian Journal of Construction Economics and Building 12(1), 37-57.
[3] Desai Megha, Dr Bhatt Rajiv (2013). "A methodology for ranking of causes of delay for residential construction projects in Indian context" International Journal of Emerging Technology and Advanced Engineering 3, 396-404.
[4] Dinesh Kumar R (2016). "Causes and effect of delay in Indian construction projects" International Research Journal of Engineering and Technology 3(4),1831-1837.
[5] Frank D.K. Fugar, Adwoa B. Agyakwah-Baah (2010). "Delay in building construction project in Ghana" Australasian Journal of Construction Economics and Building 10(1/), 103-116.
[6] Ghulam Abbas Niazai, Kassim Gidado (2014). "Causes of project delay in the construction industry in Afghanistan" International Journal of pure and applied research in engineering and technology 3, 63-74.
[7] Leena Mali, A.A. Warudkar (2016). "Causes of delay in the construction industry in Pune region of India" International Journal of Application or innovation in Engineering and Management 5(5), 306-313.
[8] Maria. Hamzah, M.A. Khoiry, I. Arshad, N.M. Tawil, A.I. Che Ani (2011). "Cause of construction delay- Theoretical framework" Science Direct Procedia Engineering 20,490-495
[9] Mohamed M. Marzouk, Tarek I. El-Rasas (2014). "Analyzing delay causes in Egyptian construction projects" Journal of advanced research 5, 49-55.
[10] Murat Gunduz, Mustafa ozdemir, Yasemin Nielsen (2013). "Qualification of delay factors using the relative importance index method for a construction project in turkey" Journal of Management in Engineering 29(2), 133-139.
[11] Owolabi James D, Amusan Lekan M, Oloke C. O, Olusanya O, Tunji- Olayeni P, OwolabiDele, PeterJoy, OmuhIgnatious (2014). "Causes and effect of delay on project construction delivery time". International Journal of Education and Research 2, 197-208.
[12] K.Rajkumar, R.Shankar, S.Vijai (2016). "An empirical study on factors affecting the construction delay" International Journal of Advanced Technology in Engineering and Science 4(5), 386-392.
[13] Remon Fayek Aziz (2013). "Ranking of delay factors in construction projects after Egyptian revolution" Alexandria engineering journal 57, 387-406.
[14] Shabbab Al Hammadi, M. Sadique Nawab (2016). "Study of delay factor in construction project" International Advanced Research Journal in Science, Engineering and Technology 3(4), 87-93.
[15] Suhas G. Awari, Manisha Jamgade, Dr Ushadevi Patil (2016). "Identifying the cause of delay in the construction industry in Mumbai region" International Journal of Modern Trend in Engineering and Research 2(7), 539543.
[16] Suhas G. Awari, Raju Narwade, Manisha Jamgade (2016). "Analysis for cause identification for the delay in building construction industry" International Journal of Modern Trends in Engineering and Research 3(10), 28-32.
[17] Tsegay Gebrehiwet, Hanbin Luo (2017). "Analysis of delay impact on a construction project on RII and correlation coefficient: Empirical study" Science direct procedia engineering 196, 366-374.
[18] Umesh Pawar, Prof. P.S. Damge (2017). "Delay analysis in the residential project by using a case study" International Journal of Innovative Research in Science, Engineering and Technology 6, 1440-1445.

