

# EFFECTS OF PROJECT COST ANALYSIS AND FACTORS AFFECTING INFLATION

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**Abstract;-** Construction projects in India are experiencing widespread delays. The purpose is to test whether the project as specified will be economically viable or whether it will generate good value for money. Leaving such feasibility studies until after a project has started, may mean that potential problems are not revealed in time to influence project planning. Due to a dramatic shift in the capacity and volume of the Indian construction sector over the last decade, the need of a systematic analysis of the reasons of delays and developing a clear understanding among the industry professionals are highly crucial. Using a selected set of attributes, this research first identified the key factors impacting delay in Indian construction industry and then established the relationship between the critical attributes for developing prediction models for assessing the impacts of these factors on delay. Delays caused by contractors can generally be attributes to poor managerial skills. Lack of planning and a poor understanding of accounting and financial principles have led to many a contractor's downfall.

**Key Words:** Cost Saving, Excess, Overrun

## 1. INTRODUCTION

The construction industry is one of the main sectors that provide important ingredients for the development of an economy. The construction industry is the tool through which society achieves its goals of urban and rural development. However, it is becoming more complex because of the sophistication of the construction process itself and the large number of parties involved in the construction process, i.e., clients, users, designers, regulators, contractors, suppliers, subcontractors, and consultants. Modern construction projects are characterized by new standards, advanced technologies, multiparty participation, and frequent owner-desired changes. Coupled with this state are inherent uncertainties and complexities in the physical, financial, and economic environment in which most projects are performed. Such conditions have made completing projects on schedule and on budget difficult task to accomplish often leading to claims on cost compensations and time extensions. This eventually leads to overrun in the completion of the project. Overrun could be defined as the time overrun either beyond completion date specified in a contract or beyond the date that the parties agree upon for delivery of a project. It is slipping over its planned schedule and is considered as common problem in construction projects. Overrun in construction project is considered one of the most common problems causing a multitude negative effect on the project and its participating parties.

Therefore, it is essential to identify the actual causes of overrun in order to minimize and avoid the overruns and their corresponding expenses. Overruns in construction can cause a number of changes in a project such as late completion, lost productivity, acceleration, increased costs, and contract termination. The party experiencing damages and the parties responsible for them are in turn responsible to recover time and cost. However, in general overrun situations are complex in nature. A overrun in an activity may not result in the same amount of project overrun. A delay caused by a party may or may not affect the project completion date and may or may not cause damage to another party. A delay may occur concurrently with other delays and all of them may impact the project completion date.

## 2. LITERATURE REVIEW

Olabosipo, Fag Olabosipo, Et. Al., 2018.

The growing need at maintaining steady cost projection of construction projects has been an issue of serious concern to both the clients and the construction practitioners on sites. This study therefore examined the factors that are considered to be affecting the cost management practice of construction firms in the southwestern Nigeria and also proffered possible ways of ameliorating the factors. It was concluded that extra focus should be placed on the identified factors with a view to reducing cost of construction, enhancing construction performance and building confidence within the construction industry in the study area.

**Ghulam Abbas Niazi and Noel Painting, (2017)**

This research aims to identify the significant factors that lead to construction cost overruns in Afghanistan. The finding of the research is that the key critical causes that potentially result in construction cost overruns in Afghanistan are: corruption, delay in progress payment by owner, difficulties in financing project by contractors, security, change the order by the owner during construction and market inflation.

**Olav Torp, Alemu Moges Belay, et. al. (2016).**

The research aim is threefold: firstly, to identify the critical factors of cost development in the planning phase. Secondly, to investigate empirically a dyadic relationship of cost deviation over time and quantitatively chart their developments. Thirdly, to analyze the construction cost data, discuss their cost developments and identify critical projects based on their actual financial impacts. The research considers 110 projects and analyze them using qualitative and quantitative research methods. The results showed higher cost escalation in the planning phase. The research identified critical factors for cost escalations at the planning phase. The average cost escalation of 110 projects (<5%) seems good, but some projects showed large cost deviations with lower financial impacts and vice versa.

**3. RESEARCH GAP**

Overrun is one of the biggest problems offer experienced on construction project sites. Overrun in sites gets negative effect such as increased cost loss of productivity and revenue may low suits between owners and contractors and contract termination. The study until now was carried out on the causes of overrun and inflation of project cost. Many researchers defined different methods for optimizing cost of project after overrun. This study will continue with framing a relationship between overrun and profitability of the project facing overrun problem.

**4. CAUSES IN OVERRUN IN CONSTRUCTION**

The study identified ten most important causes of delay from a list of 69 different causes. Ten most important causes of overrun were:

- Contractor's improper planning
- Contractor's poor site management
- Inadequate contractor experience
- Inadequate client's finance and payments for completed work
- Problems with subcontractors
- Shortage in material
- Labor supply
- Equipment availability and failure
- Lack of communication between parties
- Mistakes during the construction stage

The survey showed that all three groups generally agree on the ranking of individual overrun factors. The factors were categorized into nine major groups and were ranked. The nine groups were material, manpower, equipment, financing, changes, government relations, scheduling and controlling, environment, and contractual relationships. Based on the contractors surveyed, the most important overrun factors were:

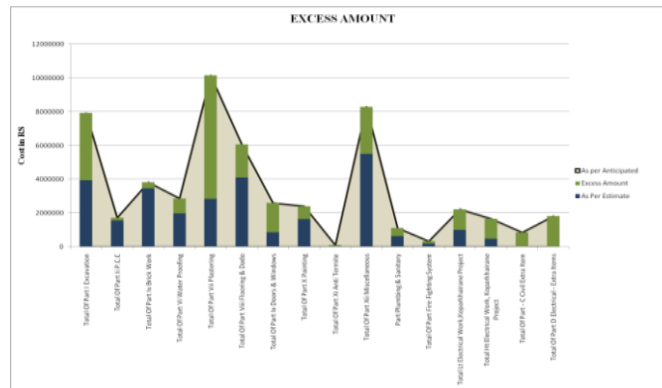
- Preparation and approval of shop drawings
- Delays in contractor's progress
- Payment by owners and
- Design changes

From the view of architects and engineers, the cash problems during construction, the relationship between subcontractors and the slow decision-making progress of the owner were the main causes of overrun. However, the owners agreed that the design errors, labor shortages and inadequate labor skills were important overrun factors. Both owners and consultants specify labor and contractor related causes as the severe and important sources of overrun while, contractors indicate that the important sources of overrun in construction projects are owners and consultant.

### 5. CASE STUDY

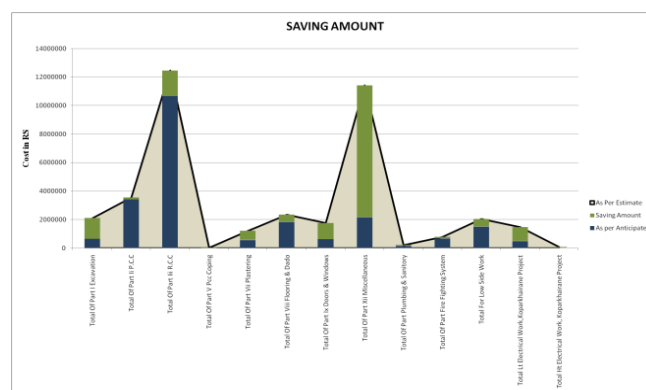
In this case study, **Excess Amount required to complete the work with its reasons** Construction of Multipurpose Building along with Community Centre at plot No. 24 Sec- 5 Kopar-Khairne project is studied for project overruns Average percentage is calculated by sum of all item's excess percentage.

Estimated amount is calculated by multiplying rate with estimated quantity and anticipated amount is calculated by multiplying rate with anticipated quantity. Excess amount is calculated by subtract estimated amount from anticipated amount and excess quantity is calculated by estimated quantity subtract from anticipated quantity. Excess percentage is calculated by estimated amount subtract from excess amount. Average percentage is calculated by sum of all item's excess percentage.



**Figure No. 1.1: Excess Amount, Estimated Amount and Anticipated Amount**

In the graph for case study 1 observed excess amount, estimated amount and anticipated amount. The bars are shown estimated amount in dark blue colour and excess amount in green colour. The area graph shows the anticipated cost shown in grey colour on backside of bars. The excess amount is maximum for total of part VII plastering and maximum estimated amount is for total of part XII miscellaneous. In the graph X-axis shows the items and Y-axis shows the cost in Rs



**Figure No. 1.2: Saving amount and saving quantity**

Saving amount and saving quantity is calculated. Estimated amount is calculated by multiplying rate with estimated quantity and anticipated amount is calculated by multiplying rate with anticipated quantity. Saving amount is calculated by subtract anticipated amount from estimated amount and saving quantity is calculated by subtract anticipated quantity from estimated quantity. Saving percentage is calculated by anticipated amount subtract from saving amount. Average percentage is calculated by sum of all items saving percentage.

In the graph observed saving amount, estimated amount and anticipated amount. The bars are shown anticipated amount in dark blue colour and saving amount in green colour. The area graph shows the estimated amount in grey colour on backside of bars. The saving amount is maximum for total of part XII miscellaneous and maximum estimated amount is for total of part III R.C.C. In the graph X-axis shows the items and Y-axis shows the cost in Rs.

## 6. RESULT AND DISCUSSION

Project Causes of overrun Due to Contractor Affecting Profitability of Project Contractor mainly affects the process of working and indirectly is responsible for overrun of project. Ineffective planning of contractor leads to shortage of material labour resources on site due to which the overrun in project is seen mainly the overrun due to contractor is due to improper planning of resources to be used on site.

It is observed that in the table 1.1 Responsible Authority and Person is Contractor. The 20 causes of overrun are here. Addition of total respondents and frequencies of respondents is given in the table. The percentage of each cause is calculated by RII method, the highest percentage is 68.00% for cause lack of sub-contractor skills and lowest percentage is 56.67% for delay in reviewing the design documents.

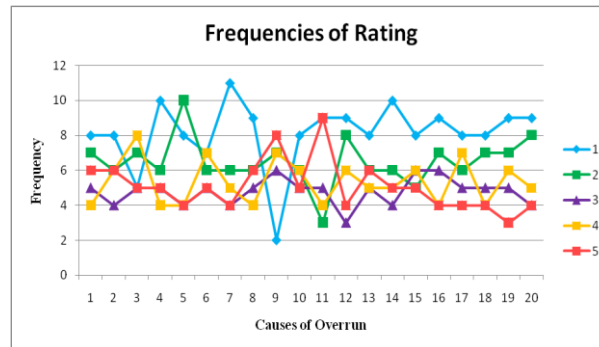


Figure No. 1.3: Frequencies of Rating for Contractor

It is observed that in the graph are frequencies of rating for client. The frequencies of rating for 20 causes of overrun are here. On X-axis causes of overrun is plotted and on Y-axis frequency is plotted. In this graph 5 frequencies show of 30 respondents. The rating of frequency no 1 is show in blue color is high and frequency no 5 show in red color is low.

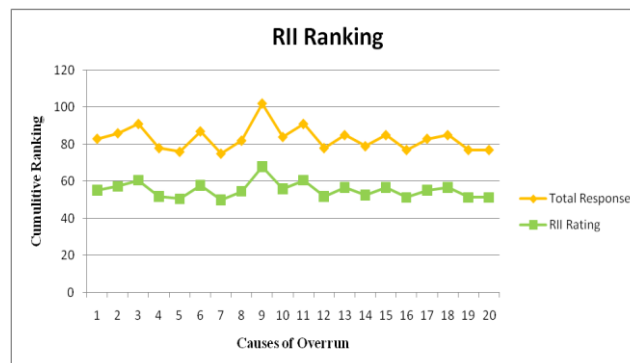


Figure No. 1.4: RII Ranking for Contractor

It is observed that in the graph is RII ranking for client. The frequencies of rating for 20 causes of overrun are here. On X-axis causes of overrun is plotted and on Y-axis cumulative ranking is plotted. In this graph total response and RII ranking are plotted.

### EVM Calculation & Scheduling in MSP

Observed in the above figure shows the table of MSP (Microsoft office Project) scheduling with EVM (Earned Value Method) for case study 1. In the Microsoft Project all the work means task added in task column in Gantt Chart with duration in day or hours then add the resources in resources sheet with cost per day or per hour. When apply in table earned value then columns like Planned value (PV), Earned value (EV), Actual cost (AC), Schedule Variance (SV), Cost Variance (CV), Estimate at Completion (EAC), Budget at Completion (BAC) and Variance at Completion (VAC) columns are seen and Schedule Performance Index (SPI) & Cost Performance Index (CPI) columns are added by insert column in table

The scheduling of work is observed in above figure1.2. The blue bars seen in the figure are indicating the duration of work and one work is complete then another work is start. In the MSP (Microsoft Project) we set the calendar for number of days of work, number of working hours, weekly holiday, national holidays, etc. The black line in the blue bar is indicate the how much work is completed in percentage. If work is 100% complete then black line on whole blue bar.

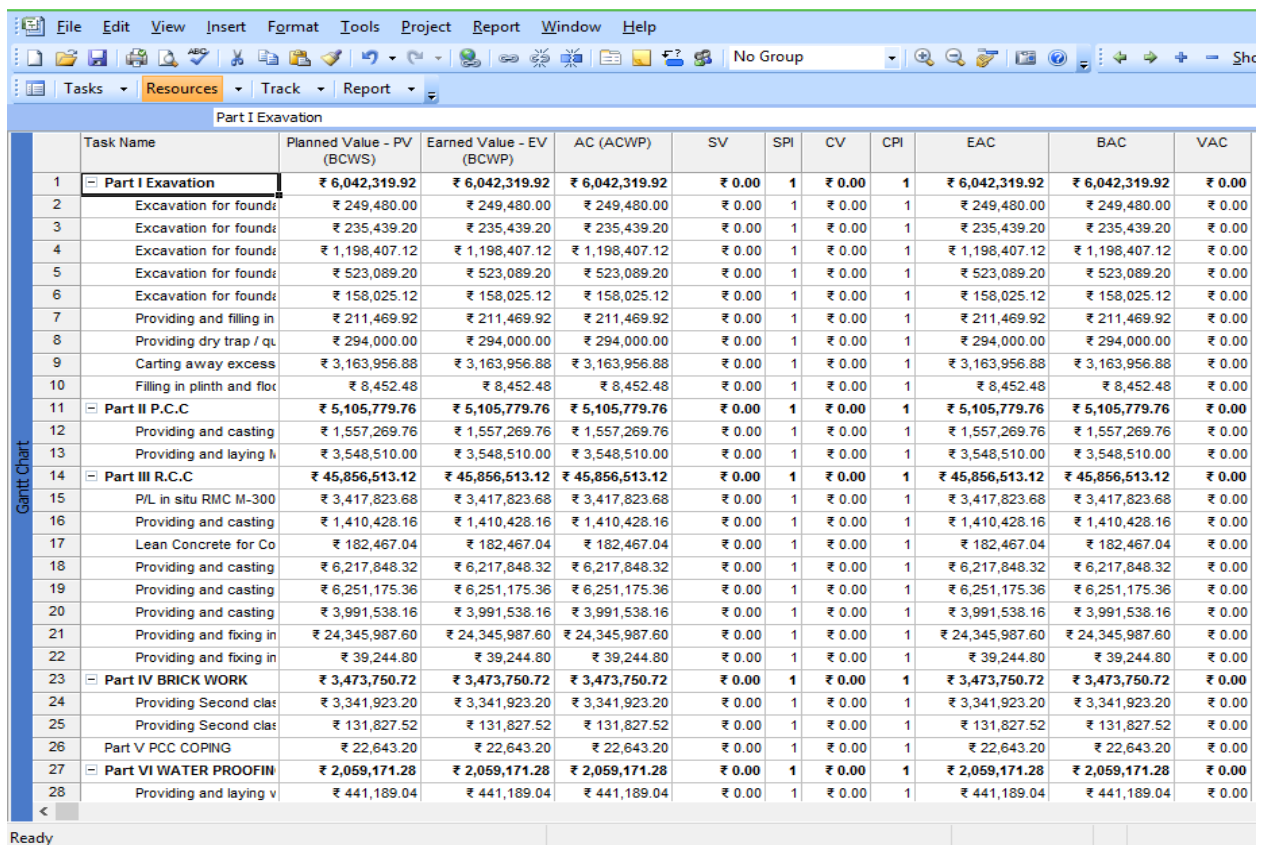
**Table No. 1.1: Causes of Overrun Affecting to Contractor**

Sr. No.	Cause of Overrun	Responsible Authority and Person	RII	%
1	Poor coordination and communication b/t contractor and other parties	Contractor	0.55	55.33
2	Financial difficulties by contractors	Contractor	0.57	57.33
3	Delay in site mobilization	Contractor	0.61	60.67
4	Often changing sub-contractors	Contractor	0.52	52.00
5	Mistakes during construction by contractors	Contractor	0.51	50.67
6	Poor contractors experience	Contractor	0.58	58.00
7	Ineffective planning and scheduling	Contractor	0.50	50.00
8	Ineffective coordination between contractors and other parties	Contractor	0.55	54.67
9	Lack of sub-contractor skills	Contractor	0.68	68.00
10	Poor site management by contractors	Contractor	0.56	56.00
11	Lack of sufficient experience of consultants	Contractor	0.61	60.67
12	Delay in reviewing the design documents	Contractor	0.52	52.00
13	Poor inspection plan by consultants	Contractor	0.57	56.67
14	Project design complexity	Contractor	0.53	52.67
15	Mistakes and discrepancies in design documents	Contractor	0.57	56.67
16	Poor coordination/communication between consultant & parties	Contractor	0.51	51.33
17	Slowness in giving instruction	Contractor	0.55	55.33
18	Inadequate quality assurance and quality control plans	Contractor	0.49	56.67
19	Conflicts amongst consultant with other parties	Contractor	0.51	51.33
20	Delay in reporting the progress of works done	Contractor	0.51	51.33

**Table No. 1.2: Causes of Overrun Ranking for Contractor**

Sr. No.	Cause of Overrun	Responsible Authority and Person	RII	Ranking
9	Lack of sub-contractor skills	Contractor	0.68	1
3	Delay in site mobilization	Contractor	0.61	2
11	Lack of sufficient experience of consultants	Contractor	0.61	3
6	Poor contractors experience	Contractor	0.58	4
2	Financial difficulties by contractors	Contractor	0.57	5
13	Poor inspection plan by consultants	Contractor	0.57	6
15	Mistakes and discrepancies in design documents	Contractor	0.57	7
10	Poor site management by contractors	Contractor	0.56	8
1	Poor coordination and communication b/t contractor and other parties	Contractor	0.55	9
17	Slowness in giving instruction	Contractor	0.55	10
8	Ineffective coordination between contractors and other parties	Contractor	0.55	11
14	Project design complexity	Contractor	0.53	12
4	Often changing sub-contractors	Contractor	0.52	13
12	Delay in reviewing the design documents	Contractor	0.52	14
16	Poor coordination/communication between consultant & parties	Contractor	0.51	15
19	Conflicts amongst consultant with other parties	Contractor	0.51	16
20	Delay in reporting the progress of works done	Contractor	0.51	17
5	Mistakes during construction by contractors	Contractor	0.51	18
7	Ineffective planning and scheduling	Contractor	0.50	19
18	Inadequate quality assurance and quality control plans	Contractor	0.49	20





Task Name	Planned Value - PV (BCWS)	Earned Value - EV (BCWP)	AC (ACWP)	SV	SPI	CV	CPI	EAC	BAC	VAC
<b>Part I Excavation</b>	<b>₹ 6,042,319.92</b>	<b>₹ 6,042,319.92</b>	<b>₹ 6,042,319.92</b>	<b>₹ 0.00</b>	<b>1</b>	<b>₹ 0.00</b>	<b>1</b>	<b>₹ 6,042,319.92</b>	<b>₹ 6,042,319.92</b>	<b>₹ 0.00</b>
Excavation for founda	₹ 249,480.00	₹ 249,480.00	₹ 249,480.00	₹ 0.00	1	₹ 0.00	1	₹ 249,480.00	₹ 249,480.00	₹ 0.00
Excavation for founda	₹ 235,439.20	₹ 235,439.20	₹ 235,439.20	₹ 0.00	1	₹ 0.00	1	₹ 235,439.20	₹ 235,439.20	₹ 0.00
Excavation for founda	₹ 1,198,407.12	₹ 1,198,407.12	₹ 1,198,407.12	₹ 0.00	1	₹ 0.00	1	₹ 1,198,407.12	₹ 1,198,407.12	₹ 0.00
Excavation for founda	₹ 523,089.20	₹ 523,089.20	₹ 523,089.20	₹ 0.00	1	₹ 0.00	1	₹ 523,089.20	₹ 523,089.20	₹ 0.00
Excavation for founda	₹ 158,025.12	₹ 158,025.12	₹ 158,025.12	₹ 0.00	1	₹ 0.00	1	₹ 158,025.12	₹ 158,025.12	₹ 0.00
Providing and filling in	₹ 211,469.92	₹ 211,469.92	₹ 211,469.92	₹ 0.00	1	₹ 0.00	1	₹ 211,469.92	₹ 211,469.92	₹ 0.00
Providing dry trap / q	₹ 294,000.00	₹ 294,000.00	₹ 294,000.00	₹ 0.00	1	₹ 0.00	1	₹ 294,000.00	₹ 294,000.00	₹ 0.00
Carting away excess	₹ 3,163,956.88	₹ 3,163,956.88	₹ 3,163,956.88	₹ 0.00	1	₹ 0.00	1	₹ 3,163,956.88	₹ 3,163,956.88	₹ 0.00
Filling in plinth and flo	₹ 8,452.48	₹ 8,452.48	₹ 8,452.48	₹ 0.00	1	₹ 0.00	1	₹ 8,452.48	₹ 8,452.48	₹ 0.00
<b>Part II P.C.C</b>	<b>₹ 5,105,779.76</b>	<b>₹ 5,105,779.76</b>	<b>₹ 5,105,779.76</b>	<b>₹ 0.00</b>	<b>1</b>	<b>₹ 0.00</b>	<b>1</b>	<b>₹ 5,105,779.76</b>	<b>₹ 5,105,779.76</b>	<b>₹ 0.00</b>
Providing and casting	₹ 1,557,269.76	₹ 1,557,269.76	₹ 1,557,269.76	₹ 0.00	1	₹ 0.00	1	₹ 1,557,269.76	₹ 1,557,269.76	₹ 0.00
Providing and laying h	₹ 3,548,510.00	₹ 3,548,510.00	₹ 3,548,510.00	₹ 0.00	1	₹ 0.00	1	₹ 3,548,510.00	₹ 3,548,510.00	₹ 0.00
<b>Part III R.C.C</b>	<b>₹ 45,856,513.12</b>	<b>₹ 45,856,513.12</b>	<b>₹ 45,856,513.12</b>	<b>₹ 0.00</b>	<b>1</b>	<b>₹ 0.00</b>	<b>1</b>	<b>₹ 45,856,513.12</b>	<b>₹ 45,856,513.12</b>	<b>₹ 0.00</b>
P/L in situ RMC M-300	₹ 3,417,823.68	₹ 3,417,823.68	₹ 3,417,823.68	₹ 0.00	1	₹ 0.00	1	₹ 3,417,823.68	₹ 3,417,823.68	₹ 0.00
Providing and casting	₹ 1,410,428.16	₹ 1,410,428.16	₹ 1,410,428.16	₹ 0.00	1	₹ 0.00	1	₹ 1,410,428.16	₹ 1,410,428.16	₹ 0.00
Lean Concrete for Co	₹ 182,467.04	₹ 182,467.04	₹ 182,467.04	₹ 0.00	1	₹ 0.00	1	₹ 182,467.04	₹ 182,467.04	₹ 0.00
Providing and casting	₹ 6,217,848.32	₹ 6,217,848.32	₹ 6,217,848.32	₹ 0.00	1	₹ 0.00	1	₹ 6,217,848.32	₹ 6,217,848.32	₹ 0.00
Providing and casting	₹ 6,251,175.36	₹ 6,251,175.36	₹ 6,251,175.36	₹ 0.00	1	₹ 0.00	1	₹ 6,251,175.36	₹ 6,251,175.36	₹ 0.00
Providing and casting	₹ 3,991,538.16	₹ 3,991,538.16	₹ 3,991,538.16	₹ 0.00	1	₹ 0.00	1	₹ 3,991,538.16	₹ 3,991,538.16	₹ 0.00
Providing and fixing in	₹ 24,345,987.60	₹ 24,345,987.60	₹ 24,345,987.60	₹ 0.00	1	₹ 0.00	1	₹ 24,345,987.60	₹ 24,345,987.60	₹ 0.00
Providing and fixing in	₹ 39,244.80	₹ 39,244.80	₹ 39,244.80	₹ 0.00	1	₹ 0.00	1	₹ 39,244.80	₹ 39,244.80	₹ 0.00
<b>Part IV BRICK WORK</b>	<b>₹ 3,473,750.72</b>	<b>₹ 3,473,750.72</b>	<b>₹ 3,473,750.72</b>	<b>₹ 0.00</b>	<b>1</b>	<b>₹ 0.00</b>	<b>1</b>	<b>₹ 3,473,750.72</b>	<b>₹ 3,473,750.72</b>	<b>₹ 0.00</b>
Providing Second clas	₹ 3,341,923.20	₹ 3,341,923.20	₹ 3,341,923.20	₹ 0.00	1	₹ 0.00	1	₹ 3,341,923.20	₹ 3,341,923.20	₹ 0.00
Providing Second clas	₹ 131,827.52	₹ 131,827.52	₹ 131,827.52	₹ 0.00	1	₹ 0.00	1	₹ 131,827.52	₹ 131,827.52	₹ 0.00
<b>Part V PCC COPING</b>	<b>₹ 22,643.20</b>	<b>₹ 22,643.20</b>	<b>₹ 22,643.20</b>	<b>₹ 0.00</b>	<b>1</b>	<b>₹ 0.00</b>	<b>1</b>	<b>₹ 22,643.20</b>	<b>₹ 22,643.20</b>	<b>₹ 0.00</b>
<b>Part VI WATER PROOFIN</b>	<b>₹ 2,059,171.28</b>	<b>₹ 2,059,171.28</b>	<b>₹ 2,059,171.28</b>	<b>₹ 0.00</b>	<b>1</b>	<b>₹ 0.00</b>	<b>1</b>	<b>₹ 2,059,171.28</b>	<b>₹ 2,059,171.28</b>	<b>₹ 0.00</b>
Providing and laying v	₹ 441,189.04	₹ 441,189.04	₹ 441,189.04	₹ 0.00	1	₹ 0.00	1	₹ 441,189.04	₹ 441,189.04	₹ 0.00

Figure No.1. 5: MSP Calculations

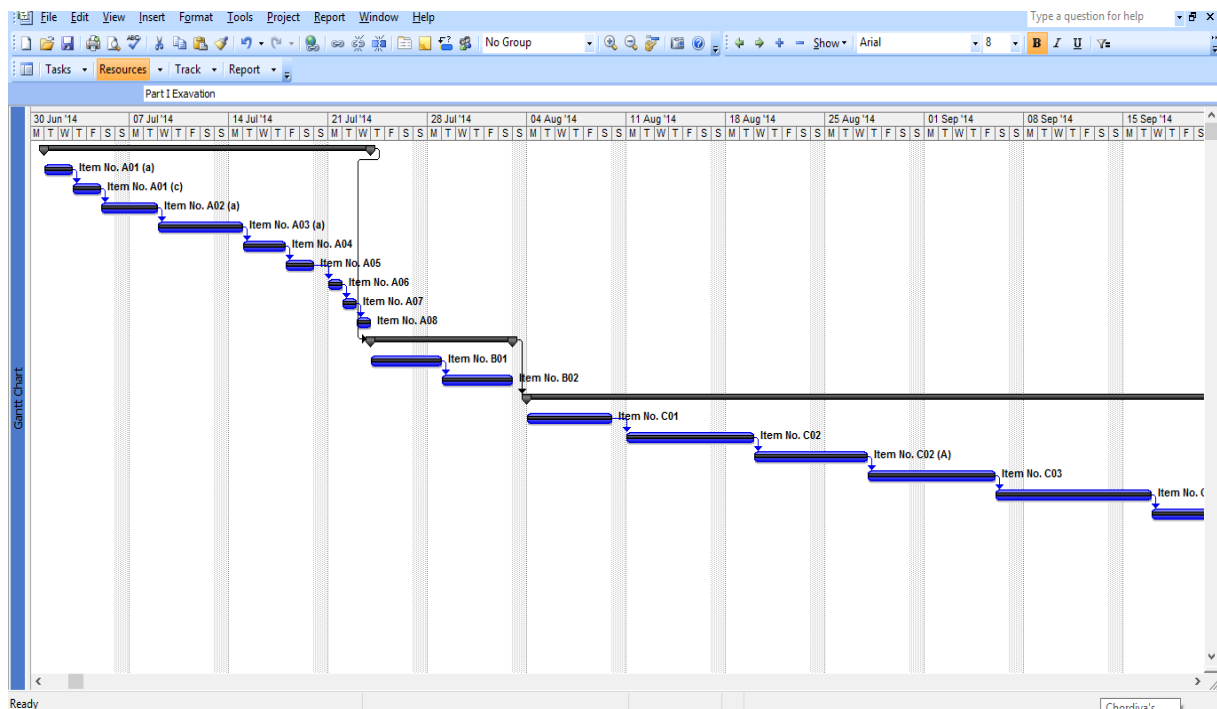


Figure No. 1.6: Calculation MSP Scheduling

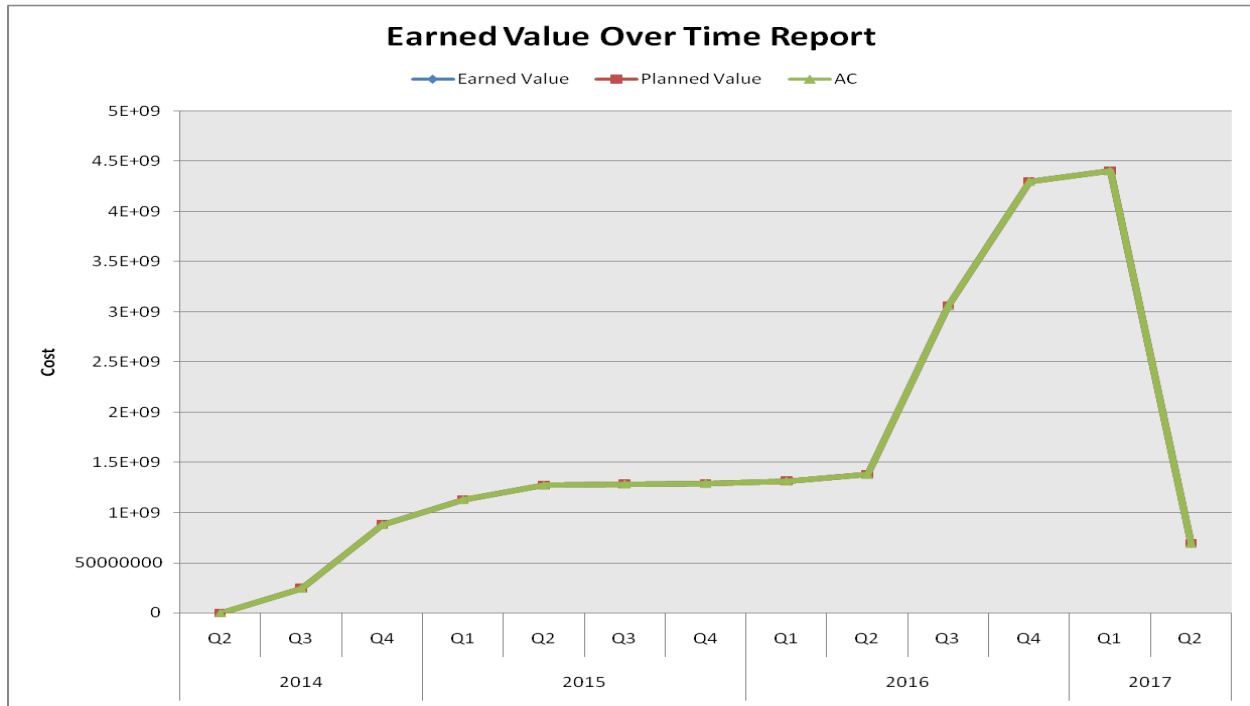


Figure No. 1.7: Earned Value over Time Report

## 7. CONCLUSIONS

The Overruns in cost and time is a never-ending threat to a construction manager and is being faced in all types of projects which include infrastructure projects, heavy construction projects, residential or commercial construction projects etc. By studying various literature review from all across world and considering three working local sites as case study on which various attributes of reducing cost overrun is analyses. The following are result from the sets of projects considered which showed large cost deviation.

- The first three factors ranked by RII method first is conflict between labour, second lack of sub-contractor skills and third is poor financial control mechanism. The first one conflict between labour in the category of labour its RII is 0.70, second one lack of sub-contractor skills in the category of contractor its RII is 0.68 and third one poor financial control mechanism in the category is client its RII is 0.63.
- Te severity index and frequency index of the factors are, for conflict between labour is 70.00, for lack of sub-contractor skills is 68.00 and for poor financial control mechanism is 63.33.
- The average of percentage excess for case study 1 is 1.02 and percentage saving is 1.10. The average of percentage excess for case study 2 is 2.71 and percentage saving is 4.39. The average of percentage excess for case study 3 is 1.90 and percentage saving is 0.15.
- The average percentage cost growth rate for all three case studies is 98.62% and average actual cost percentage change for all three case studies is 97.20%.

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