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Scheduling and Cost Optimization of Multi-Storey Building

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Abstract: ***Now a days construction gets delayed in the site due to the factors such as inefficient management, design issues, economic variation, coordination failure between time schedule and execution etc. The major problem faced by the construction sector is not able to manage the fund allocated for the work and not able to complete the work in targeted days. This can be overcome by the implementation of scheduling and cost optimization process in the construction field. Scheduling is a critical component of successful time management. Optimizing cost should be carried out to aware the building cost is kept within the estimated cost limits .This paper deals with scheduling of multi-story building and cost effective method to find required cost for completion of the project. On going project is located at Nagar Kovil and Manual scheduling data collected from the site. Scheduling of the project is done with primavera p6 software. Cost required for the project is also computed with primaveraP6 software. For reducing the cost of the project, required actions are taken. The cost is reduced by proper using of resources, such as manpower, materials and machines. Computerized scheduling provides clear scheduling data for execution of the project. Cost required for the project execution is also reduced with proper scheduling process. Cost is optimized by using a dynamic programming method. Microsoft excel is used for dynamic method of cost optimization. In this project cost is considerably reduced by using the dynamic programming method of cost optimization techniques.***

Keywords: Scheduling, Cost optimization, Dynamic programming, Execution, Primavera P6,

I. INTRODUCTION

The scheduling of resources in a project and multi-project environment is a complex process, but the focus should be to make it simple by scheduling a few vital resources and drive the forecast of the remaining resources.

Construction industry is the leading industry that pushes forward the developing progress in all over the world. It is well known that successfully completed construction project are a result of careful planning, execution and established techniques, such as critical path method and bar charts are commonly used to enable this to be done in a systematic way. Although every project has its own resource requirements but the type and quantity of resources vary considerably during the project implementation.

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Now a days the competition in construction industry is usually very strict and serious. The project are scheduled using some software's such as Microsoft project, primavera p6, etc., which are based on activities precedence and use appropriate optimization program to find the decision variables at cost total minimal.

In this paper execution of multistory building is scheduled by using primavera p6 and cost is optimized by using dynamic programming method via Microsoft excel solver implementation.

W. Eric Showalter, Ph.D; and Daniel W. Halpin, October 1, 2008: The work presented here uses cost as a decision variable in restoration projects. A methodology has been developed that will optimize the selection of remediation technologies based on cost. This methodology uses geostatistics and dynamic programming to break a site into discrete cells and then select the optimal sequence of remediation technologies.

Y.Gholipour;2013-03-27: The research includes investigation of some real multi-storey buildings during their execution periods and surveying the history of the activities. It is shown that the common resource demand variation curve of the projects may be expanded or displaced to achieve an optimum distribution scheme. Of course, it may cause some delay to some projects, but it has minimum influence on whole execution period of all projects and its influence on procurement cost of the projects is considerable.

C.K.Georgekutty, Dr.Georgemathew ,(July-Aug 2012): Researchers are trying to find out the reasons why projects could not complete in time. An exhaustive Literature review has been conducted. The research problem is identified and derived from the literature study.

Li, Heng and Chan, Neo and Guo, H.L. and Lu, Weisheng and Skitmore, Martin(2009): This paper describes the use of virtual prototyping to optimize construction planning schedules by analyzing resource allocation and planning with integrated construction models, resource models, construction planning schedules and site-layout plans. A real life case study is presented that demonstrates the use of a virtual prototyping enabled resource analysis to reallocate space, logistic on access road and arrange tower cranes to achieve a 6-day floor construction cycle.

Ming Lu1 and Heng Li, August 1, 2003: In this paper a sample application of the proposed RACPM for planning a footbridge construction project is also given to demonstrate that practitioners can readily interpret and utilize a RACPM schedule by relating the RACPM to the classic CPM. This paper is to study the feasibility of producing UHSC using available local materials with the inclusion of steel fibers and investigate its properties and durability.

Different mechanical properties are evaluated. Microstructural investigations of UHS-FRC concrete were also performed. The microstructural investigations shed some light on the nature of interfacial bond of fibres and the cement paste and its effect on its mechanical and fracture properties.

Research significance

For using software primavera P6 for scheduling the activities of work for the site helps to reduce the completion time of the project. Mathematical calculation such as dynamic programming method is used for cost optimization is used to reduce the cost required for the project. Existing literature review is modified for getting cost effective technique for completion of the project.

II. DETAILS OF THE PROJECT

Table - I :Particulars about the project

S.No	Information	Project details
1	Location of the building	Nagar kovil
2	Type of the building	Framed structures
3	Duration of the project	Three years
4	Number of stories	G+4
5	Cost of the project	Rs.6,84,92,085
6	Type of soil	Hard soil

III.METHODOLOGY

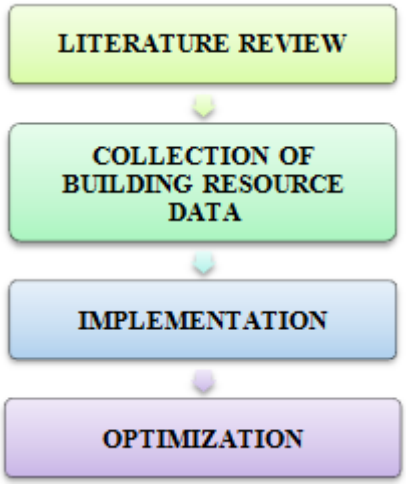


Fig. 1. Flow chart description procedure

A. Literature review

In this literature review a detailed study is carried out on the journals and get an idea about the project, what to do and how to prepare a project. Study the scope of work in detail from journals and decide on the sequence of preparing a project.

B. Collection of building resource data

The required data were collected from an on going construction site. Decide on the sequence of construction including methods to be adopted and equipment's to be used. If available drawings do not give adequate information, obtain as much as possible from clients/consultants/design office.

C. Implementation

Scheduling is done by using critical path method and then this will be implemented on the primavera p6 software.

D. Optimization

Optimization is done by using dynamic programming method and then this will be implemented on the Microsoft excel software.

III. COLLECTION OF BUILDING RESOURCES DATA

The scheduling data for the on going project is collected directly from the site. From the collected scheduled data is used for the software oriented program such as primavera P6. This scheduling data is prepared by the project manager in the site. Preparing scheduling data is done with more accurate manner.

The scheduling table comprising of five columns. Each columns represent the serial number, activity details , duration time, starting and finishing time of the particular activity respectively. This work is done with more accuracy. This table clearly shows the total duration of the whole activity for the project and every activity starting and finishing time also clearly represent in the scheduling table.

Table - II: Scheduling Table

S.No	Activity	Duration	Start	Finish
1	Sub Structure	424	09/12/2014	22/07/2016
2	Basement Floor	172	09/12/2014	05/08/2015
3	Earth Work Excavation	36	06/08/2015	24/09/2015
4	P.C.C	32	25/09/2015	09/11/2015
5	Water Proofing	25	10/11/2015	14/12/2015
6	Grade Beam/Raft Concrete	7	15/12/2015	23/12/2015
7	R.C.C. Column Concrete	5	24/12/2015	30/12/2015
8	R.C.C Wall Concrete	9	31/12/2015	12/01/2016
9	Earth Work For Above 6 Th Grid	36	25/09/2015	13/11/2015
10	R.C.C Raft Footing	37	16/11/2015	05/01/2016
11	Basement P.C.C Laying	14	06/01/2016	25/01/2016
12	Water Proofing	18	26/01/2016	18/02/2016
13	Raft R.C.C	22	19/02/2016	21/03/016
14	Wall Concrete	27	22/03/2016	27/04/2016
15	Column Concrete	27	22/03/2016	27/04/2016
16	East & West Side Slab Shuttering	22	28/04/2016	27/05/2016
17	R.C.C Slab Concrete	1	30/05/2016	30/05/2016
18	Stp &Ug Sump Area	18	31/05/2016	23/06/2016
19	Excavation	2	24/06/2016	27/06/2016
20	P.C.C	1	28/06/2016	28/06/2016
21	Water Proofing	2	29/06/2016	30/06/2016
22	Raft R.C.C	1	01/07/2016	01/07/2016
23	Wall & Column Concrete	6	04/07/2016	11/07/2016
24	Slab Shuttering & Reinforcement	8	12/07/2016	21/07/2016
25	R.C.C Slab Concrete	1	22/07/2016	22/07/2016
26	Super Structure	317	28/06/2016	13/09/2017
27	Ground Floor	107	25/07/2016	02/03/2017
28	Structure	52	21/12/2016	02/03/2017
29	Grid 12 To 6 Part	18	03/03/2017	28/03/2017
30	R.C.C. Column 11'6" & 19'6"	9	28/06/2016	08/07/2016
31	Slab Shuttering	7	11/07/2016	19/07/2016
32	Reinforcement	6	20/07/2016	27/07/2016
33	R.C.C Slab Concrete	1	28/07/2016	28/07/2016
34	De-Shuttering	7	29/07/2016	08/08/2016

35	Grid 6 To 1 (Balance Part)	19	09/08/2016	02/09/2016
36	R.C.C. Column	10	29/03/2017	11/04/2017
37	Slab Shuttering	9	12/04/2017	24/04/2017
38	Reinforcement	9	25/04/2017	05/05/2017
39	R.C.C Slab Concrete	1	08/05/2017	08/05/2017
40	De-Shuttering	5	09/05/2017	15/05/2017
41	Finishing	72	16/05/2017	23/08/2017
42	Brick Work	26	16/05/2017	20/07/2017
43	Ceiling Plastering	15	21/06/2017	11/07/2017
44	Internal Plastering	46	12/07/2017	13/09/2017
45	Mezzanine Floor	252	21/06/2017	07/06/2018
46	Structure	102	14/09/2017	02/02/2018
47	Grid 12 To 6 Part	19	21/06/2017	17/07/2017
48	R.C.C. Column Concrete	9	18/07/2017	28/07/2017
49	Slab Shuttering	8	31/07/2017	09/08/2017
50	Reinforcement	9	10/08/2017	22/08/2017
51	R.C.C Slab Concrete	1	23/08/2017	23/08/2017
52	De-Shuttering	5	24/08/2017	30/08/2017
53	Grid 6 To 1 (Balance Part)	60	24/08/2017	15/11/2017
54	R.C.C. Column	25	16/11/2017	20/12/2017
55	Slab Shuttering	22	21/12/2017	19/01/2018
56	Reinforcement	20	22/01/2018	16/02/2018
57	R.C.C Slab Concrete	1	19/02/2018	19/02/2018
58	De-Shuttering	13	20/02/2018	08/03/2018
59	Finishing	27	09/03/2018	16/04/2018
60	Brick Work	17	17/04/2018	09/05/2018
61	Ceiling Plastering	21	10/05/2018	07/06/2018
62	Internal Plastering	14	10/05/2018	29/02/2018
63	First Floor (Double Height)	87	19/02/2018	19/06/2018
64	Structure	15	30/05/2018	19/06/2018
65	R.C.C. Column Concrete	9	19/02/2018	01/03/2018
66	Slab Shuttering	5	02/03/2018	08/03/2018
67	Reinforcement	6	09/03/2018	16/03/2018
68	R.C.C Slab Concrete	1	19/03/2018	19/03/2018
69	De-Shuttering	5	20/03/2018	26/03/2018
70	Finishing	10	27/03/2018	09/04/2018
71	Brick Work	9	27/03/2018	06/04/2018
72	Ceiling Plastering	6	09/04/2018	16/04/2018
73	Internal Plastering	10	09/04/2018	20/04/2018
74	Second Floor (Rooms Floor)	58	20/03/2018	07/06/2018
75	Structure	19	23/04/2018	17/05/2018
76	R.C.C. Column Concrete	13	20/03/2018	05/04/2018
77	Slab Shuttering	6	06/04/2018	13/04/2018
78	Reinforcement	7	16/04/2018	24/04/2018
79	R.C.C Slab Concrete	1	25/04/2018	25/04/2018
80	De-Shuttering	6	26/04/2018	03/05/2018
81	Finishing	17	04/03/2018	28/05/2018
82	Brick Work	13	04/04/2018	22/05/2018
83	Ceiling Plastering	8	23/05/2018	01/06/2018
84	Internal Plastering	12	23/05/2018	07/07/2018
85	Third Floor (Rooms Floor)	57	04/05/2018	23/06/2018
86	Structure	22	08/05/2018	09/06/2018
87	R.C.C. Column Concrete	13	04/05/2018	22/05/2018
88	Slab Shuttering	8	23/05/2018	01/06/2018
89	Reinforcemet	8	04/06/2018	13/06/2018
90	R.C.C Slab Concrete	1	14/06/2018	14/06/2018
91	De-Shuttering	6	15/06/2018	22/06/2018
92	Finishing	13	25/06/2018	11/07/2018
93	Brick Work	8	25/06/2018	04/07/2018
94	Ceiling Plastering	8	05/07/2018	16/07/2018
95	Internal Plastering	13	05/07/2018	23/07/2018
96	Fourth Floor (Rooms Floor)	57	25/07/2018	11/09/2018
97	Structure	18	24/07/2018	16/08/2018
98	R.C.C. Column Concrete	10	25/06/2018	06/07/2018
99	Slab Shuttering	8	12/07/2018	23/07/2018
100	Reinforcement	7	24/07/2018	01/08/2018
101	R.C.C Slab Concrete	1	02/08/2018	02/08/2018
102	De-Shuttering	4	03/08/2018	08/08/2018
103	Finishing	21	09/08/2018	06/09/2018
104	Brick Work	14	09/08/2018	28/08/2018
105	Ceiling Plastering	8	29/08/2018	07/09/2018
106	Internal Plastering	10	29/08/2018	11/09/2018
107	Terrace Floor	75	10/09/2018	21/12/2018
108	Parapet Wall	8	10/09/2018	19/09/2018
109	External Plastering	25	20/09/2018	24/10/2018
110	Lift Room & Machine Room	21	20/09/2018	18/10/2018
111	Overhead Tank	21	19/10/2018	16/11/2018
112	Weathering Course & Tiling	25	19/11/2018	21/12/2018
113	Handing Over	1	19/11/2018	19/11/2018

IV. IMPLEMENTATION SCHEDULING DATA

Several softwares were used for scheduling such as Microsoft Project, Gantt Chart, primavera P6, ZOHO Project, Fast Track Schedule 9, Track Time. In this the scheduling is done by using critical path method and then this will be implemented on the primavera p6 software.

From the scheduling data collected from the site, the primavera P6 software output is obtained. Using the software of Primavera P6 the scheduling of every activities are done more accurately.

A critical path method (CPM) is a network of events , each one of them linked to the following activities. Each activity is represented as a node on the network, and connecting lines are drawn to represent the time schedule to complete that activity.

A critical path method schedule must be completed using the following steps:

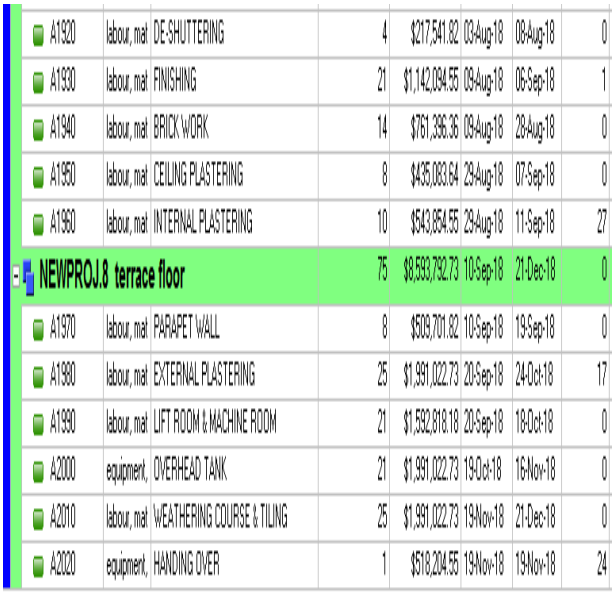
- ✓ Identify the activities
- ✓ Determine the sequence of the activities
- ✓ Connect or create a network of the activities
- ✓ Enter the completion time for every activity
- ✓ Identify the critical path or the longest possible path to complete all activities
- ✓ One important and valuable component is the CPM update progress, allowing to track closely the performance and time used to complete the activities.

Activity ID	Resources	Activity Name	Original Duration	Budgeted Total Cost	Start	Finish	Total Float
NEWPROJ multistorey buildings			1054	$68,492,065.09	09-Dec-14	21-Dec-18	0
NEWPROJ.1 substructure			424	$14,180,566.00	09-Dec-14	22-Jul-16	0
A1000	labour, mat	BASEMENT FLOOR	172	$3,491,650.18	09-Dec-14	05-Aug-15	0
A1010	equipment,	EARTH WORK EXCAVATION	36	$730,852.36	06-Aug-15	24-Sep-15	0
A1020	labour, mat	P.C.C	32	$649,646.55	25-Sep-15	09-Nov-15	27
A1030	equipment,	WATER PROOFING	25	$507,536.36	10-Nov-15	14-Dec-15	27
A1040	labour, mat	GRADE BEAM /RAFT CONCRETE	7	$431,405.91	15-Dec-15	23-Dec-15	27
A1050	labour, mat	R.C.C COLUMN CONCRETE	5	$507,536.36	24-Dec-15	30-Dec-15	27
A1060	equipment,	R.C.C WALL CONCRETE	9	$507,536.36	31-Dec-15	12-Jan-16	27
A1070	labour, mat	EARTH WORK FOR ABOVE 6TH GRID	36	$730,852.36	25-Sep-15	13-Nov-15	0
A1080	labour, mat	R.C.C RAFT FOOTING	37	$761,304.55	16-Nov-15	05-Jan-16	0
A1090	equipment,	BASEMENT P.C.C LAYING	14	$284,220.36	06-Jan-16	25-Jan-16	0
A1100	labour, mat	WATER PROOFING	18	$761,304.55	26-Jan-16	18-Feb-16	0
A1110	labour, mat	RAFT R.C.C	22	$446,632.00	19-Feb-16	21-Mar-16	0
A1120	labour, mat	WALL CONCRETE	27	$548,139.27	22-Mar-16	27-Apr-16	0
A1130	labour, mat	COLUMN CONCRETE	27	$548,139.27	22-Mar-16	27-Apr-16	0
A1140	labour, mat	EAST & WEST SIDE SLAB SHUTTERING	22	$446,632.00	28-Apr-16	27-May-16	0
A1150	labour, mat	R.C.C SLAB CONRETE	1	$507,536.36	30-May-16	30-May-16	0
A1160	labour, mat	STP &UP SUMP AREA	18	$365,426.18	31-May-16	23-Jun-16	0
A1170	labour, mat	EXCAVATION	2	$380,652.27	24-Jun-16	27-Jun-16	0
A1180	labour, mat	R.C.C	1	$126,884.09	28-Jun-16	28-Jun-16	0
A1190	labour, mat	WATER PROOFING	2	$304,521.82	29-Jun-16	30-Jun-16	0
A1200	labour, mat	RAFT R.C.C	1	$126,884.09	01-Jul-16	01-Jul-16	0
A1210	labour, mat	WALL&COLUMN CONCRETE	6	$253,768.18	04-Jul-16	11-Jul-16	0
A1220	equipment,	SLAB SHUTTERING & REINFORCEMENT	8	$380,652.27	12-Jul-16	21-Jul-16	0
A1230	labour, mat	R.C.C SLAB CONCRETE	1	$380,652.27	22-Jul-16	22-Jul-16	0

Fig. 2. Primavera P6 software output

Activity ID	Resources	Activity Name	Original Duration	Budgeted Total Cost	Start	Finish	Total Float
A1670	equipment,	STRUCTURE	19	$1,171,574.55	23-Apr-18	17-May-18	156
A1680	labour, mat	R.C.C COLUMN CONCRETE	13	$801,603.64	20-Mar-18	05-Apr-18	0
A1690	equipment,	SLAB SHUTTERING	6	$369,970.91	06-Apr-18	13-Apr-18	0
A1700	labour, mat	REINFORCEMET	7	$431,632.73	16-Apr-18	24-Apr-18	0
A1710	material, ec	R.C.C SLAB CONCRETE	1	$61,661.82	25-Apr-18	25-Apr-18	0
A1720	equipment,	DE-SHUTTERING	6	$369,970.91	26-Apr-18	03-May-18	0
A1730	labour, mat	FINISHING	17	$1,048,250.91	04-May-18	28-May-18	149
A1740	labour, mat	BRICK WORK	13	$801,603.64	04-May-18	22-May-18	119
A1750	labour, mat	CEILING PLASTERING	8	$493,294.55	23-May-18	01-Jun-18	145
A1760	labour, mat	INTERNAL PLASTERING	12	$739,941.82	23-May-18	07-Jun-18	119
NEWPROJ.6 third floor(rooms floor)			57	$5,522,000.00	04-May-18	23-Jul-18	109
A1770	labour, mat	STRUCTURE	22	$1,214,840.00	08-Jun-18	09-Jul-18	119
A1780	equipment,	R.C.C COLUMN CONCRETE	13	$717,860.00	04-May-18	22-May-18	0
A1790	labour, mat	SLAB SHUTTERING	8	$441,760.00	23-May-18	01-Jun-18	0
A1800	equipment,	REINFORCEMET	8	$441,760.00	04-Jun-18	13-Jun-18	0
A1810	labour, mat	R.C.C SLAB CONCRETE	1	$55,220.00	14-Jun-18	14-Jun-18	0
A1820	equipment,	DE-SHUTTERING	6	$331,320.00	15-Jun-18	22-Jun-18	0
A1830	labour, mat	FINISHING	13	$717,860.00	25-Jun-18	11-Jul-18	0
A1840	equipment,	BRICK WORK	8	$441,760.00	25-Jun-18	04-Jul-18	91
A1850	labour, mat	CEILING PLASTERING	8	$441,760.00	05-Jul-18	16-Jul-18	114
A1860	equipment,	INTRNAL PLASTERING 13	13	$717,860.00	05-Jul-18	23-Jul-18	91
NEWPROJ.7 fourth floor (rooms floor)			57	$5,492,330.91	25-Jun-18	11-Sep-18	73
A1870	equipment,	STUCTURE	18	$976,938.18	24-Jul-18	16-Aug-18	91
A1880	labour, mat	R.C.C COLUMN CONCRETE	10	$543,854.55	25-Jun-18	06-Jul-18	3
A1890	labour, mat	SLAB SHUTTERING	8	$435,083.64	12-Jul-18	23-Jul-18	0
A1900	labour, mat	REINFORCEMET	7	$380,698.18	24-Jul-18	01-Aug-18	0
A1910	labour, mat	R.C.C SLAB CONCRETE	1	$54,395.45	02-Aug-18	02-Aug-18	0

Fig. 3. output of primavera P6 software



A1920	labour, mat	DE-SHUTTERING	4	$217,541.82	03-Aug-18	08-Aug-18	0
A1930	labour, mat	FINISHING	21	$1,142,084.55	09-Aug-18	06-Sep-18	1
A1940	labour, mat	BRICK WORK	14	$761,396.36	09-Aug-18	28-Aug-18	0
A1950	labour, mat	CEILING PLASTERING	8	$435,083.64	29-Aug-18	07-Sep-18	0
A1960	labour, mat	INTERNAL PLASTERING	10	$543,854.55	29-Aug-18	11-Sep-18	27
NEWPROJ.8 terrace floor			75	$8,593,792.73	10-Sep-18	21-Dec-18	0
A1970	labour, mat	PARAPET WALL	8	$509,701.82	10-Sep-18	19-Sep-18	0
A1980	labour, mat	EXTERNAL PLASTERING	25	$1,991,022.73	20-Sep-18	24-Oct-18	17
A1990	labour, mat	LIFT ROOM & MACHINE ROOM	21	$1,592,818.18	20-Sep-18	18-Oct-18	0
A2000	equipment,	OVERHEAD TANK	21	$1,991,022.73	19-Oct-18	16-Nov-18	0
A2010	labour, mat	WEATHERING COURSE & TILING	25	$1,991,022.73	19-Nov-18	21-Dec-18	0
A2020	equipment,	HANDING OVER	1	$518,204.55	19-Nov-18	19-Nov-18	24

Fig. 4. output from software

A. Cost of the project

Estimated cost of the project calculated from the primavera P6 software is Rs.6,84,92,085. This cost is reduced by cost optimization techniques. Dynamic programming method is used for reducing the cost of the project. The required cost for completion of the project is considerably reduced.

B. Cost optimization

Finding an alternative with the most cost effective or highest achievable performance under the given constraints, by maximizing desired factors and minimizing undesired ones. In comparison, maximization means trying to attain the highest or maximum result or outcome without regard to cost or expense.

Practice of optimization is restricted by the lack of full information, and the lack of time to evaluate what information is available. In computer simulation of business problems, optimization is achieved usually by using dynamic programming techniques of operations research.

Several softwares were used for optimization such as Function Designer, Microsoft Excel, SAMPL, MATLAB, AMPL, TORA. In this project cost is optimized by using dynamic programming method via Microsoft excel solver implementation.

Dynamic programming is both a mathematical optimization method and a computer programming method. In both contexts it refers to simplifying a complicated problem by breaking it down into simpler sub problems in a recursive manner.

Table - III: Cost optimization calculation

AREA / RESOURCE	Basement floor	Ground floor	Mezzanine floor	First floor	Second floor	Third floor	Fourth floor	Terrace floor
Labour (A)	9631566	11657690	11087550	4048550	6001505	5231000	5219930	8231792
Material (B)	3801000	422,500	430000	138500	175500	178000	166000	208000
Equipment (C)	748000	258500	281500	88500	112500	113000	107000	154000

Table – IV : Consolidation table

Area / Resource	Basement floor	Ground floor	Mezzanine floor	First floor	Second floor	Third floor	Fourth floor	Terrace floor
G	13432566	12080190	11517550	4187050	6177005	5409000	5385930	8439792
H	4549000	681000	711500	227000	288000	291000	273000	362000

Obtain the optimum sequence by using the steps in Johnson's algorithm

4	5	8	3	1	2	6	7

Table – V : Total elapsed cost

Optimum sequence	Resource A		Resource B		Resource C	
	start	finish	Start	Finish	start	Finish
4	0	4048550	4048550	4187050	4187050	4275550
5	4048550	10050055	10050055	10225555	10225555	10338055
8	10050055	18281847	18281847	18489847	18489847	18643847
3	18281847	29369397	29369397	29799397	29799397	30080897
1	29369397	39000963	39000963	42801963	42801963	43549963
2	39000963	50658653	50658653	51081153	51081153	51339653
6	50658653	55889653	55889653	56067653	56067653	56180653
7	55889653	61109583	61109583	61275583	61275583	**61382583**

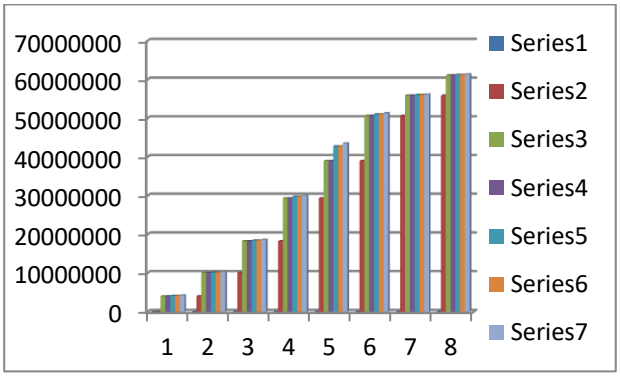


Fig 5: Microsoft Excel output for cost optimization

V. CONCLUSION

- The datas were collected successively from the proposed site and scheduling process are executed based on the concerned activities.
- The results obtained from the analysis of multistorey building is scheduled by using primavera p6 software and the cost is reduced by optimization method.
- Dynamic programming sequencing problem is used for easy calculation of cost optimization.
- Total cost for resources is Rs.**6,84,92,085**,.The total elapsed cost is computed by cost optimization technique using dynamic programming method is Rs.**6,13,82,583**.
- The reduction in the cost variation shows **Rs.71,09,502.**
- Thus the cost of project can be reduced by appropriate planning, scheduling, execution and established techniques.
- Therefore implementation of scheduling and cost optimization techniques in construction field will be more effective in execution of building work in an economic manner.

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