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To Compare CPM and CCPM Methodology for Canal Construction

Diti Chhaya[1] Pooja Gohil[2]

[1]M Tech CPM Student [2]Assistant Professor, Department of Civil Engineering

Abstract: Time is the most important factor nowadays. Many projects in India are not complete on time. The purpose of this research paper is to study CPM (Critical Path Method) and CCPM (Critical Chain Project Management) techniques and propose one of them which gives better result and complete the project at time and budget. In this research paper applied CCPM and CPM method on Canal Construction site. After Comparing both the methods CCPM method can be best to use as per resource availability. CCPM can focus on overall project by eliminating constrains and controlling the project by adding three types of buffers. Resource buffer, feeding buffer, Project Buffer. In this project complete the chain by adding the feeding buffer at the end of non-critical chain and project buffer at the end of Critical Chain. CPM method is applied on some part of the running project which gives 18 days of critical path. It depends on activity duration and dependency of each activity. It also depends on one activity has to be completed before another starts.it could be better but the lake of materials, late transportation of materials, insufficient material and environmental factor affected on construction duration.
Keywords: CCPM, CPM, Time, cost.

I. INTRODUCTION

CPM: The Critical Path Method or CPM is a network analysis technique concerned with planning and controlling of complex, but routine projects. Simply, Critical path method is generally used for the projects whose time duration is known with certainty and also the amount of resources required for the completion of the project is assumed to be known.

CCPM: Critical chain project management (CCPM) is a method of planning and managing projects that emphasizes the resources (people, equipment, physical space) required to execute project tasks. It was developed by Eliyahu M. Goldratt. It differs from more traditional methods that derive from critical path and PERT algorithms, which emphasize task order and rigid scheduling. A critical chain project network strives to keep resources leveled, and requires that they be flexible in start times.

CANAL: Canals, or navigations, are human-made channels, or artificial waterways, for water conveyance, or to service water transport vehicles.

A. Need for study
1) Today's reality that most of infrastructure projects in India do not finish on time, on scope and within budget.
2) The Ministry of Statistics and Programmed Implementation, Government of India has reported that out of 782 construction projects in India monitored by it, a total of 215 projects are delayed with the time over-run ranging from 1 to 261 months.
3) CCPM method is using less as compare to CPM and other methods and also not used before for Irrigation Canal type of projects.

B. Objective
1) Apply critical chain project management and critical path method to find out which method is more accurate for reduce time duration and budget.
2) To propose one method which is better

II. DATA COLLECTION

A. Site Details
1) Name of canal: Udhna canal site.
2) Budget of construction: 11 crores.
3) Days of construction: 50 days
4) Location of construction: Surat, Gujarat
5) Type of project: Minor canal construction project.
6) Total area of construction: 11 km.

7) Client of construction: Department of Government of irrigation.
8) Handling this project: MMC consultancy

Figure 1 canal location

B. *List Of Available Resources*
1) Excavator = 1
2) JCB backhoe loader = 1
3) Water tanker = 3
4) Extra Hitachi with plate = 1
5) Transit mixture =
6) Labours = 22
7) RMC plant = 1

C. *Steps required in Canal Construction*

TABLE 1 Steps required for canal construction

| Sr no	Steps for canal construction	unit	Quantity
1	Excavation 150 to 200 m	days	5
2	Levelling after excavation with machine	days	6
3	Then levelling with labour	days	5
4	Lining With transit mixture	days	7
5	The day after lining curing with the help of labour	days	1
6	Sprinkling water at that part	days	1
7	Curing compound chemical spreading at slope and water spreading at base	days	2
8	Last store the water at base for strong base	days	6
9	After construct the canal set the soil near slops with	days	1
10	Again repeat the same process	days	_

III. DATA ANALYSIS

A. WBS
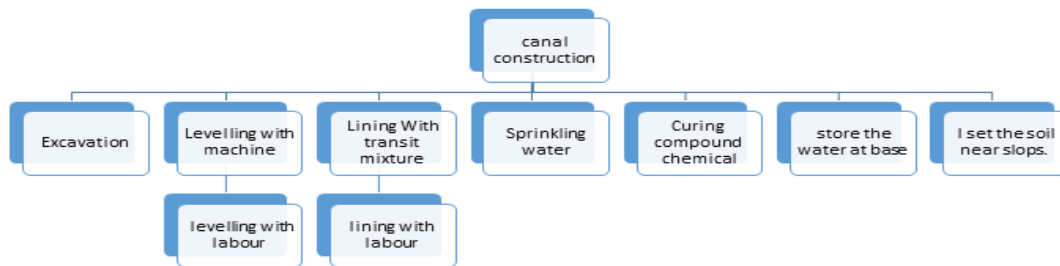
Figure 2 Work break down structure of activates

B. *List of Activity and Duration*

TABLE 2 List of Activity and Duration

Activity	Name of the activity	Duration
A	Excavation 150 to 200 m	5 day
B	Levelling after excavation with machine	1 day
C	Then levelling with labour	1 day
D	Lining With transit mixture	1 day
E	The day after lining curing with the help of labour	2 days
F	Sprinkling water at that part	1 day
G	Curing compound chemical spreading at slope and water spreading at base	2 days
H	Last store the water at base for strong base	7 days
I	After construct the canal set the soil near slops with.	1 day

C. *CPM Chart*
1) Here given CPM network diagram above.
2) Blue line sows non critical path
3) Red line shows critical path.
4) As PR rule of critical path method longest path of completion activity should be given 18 days.
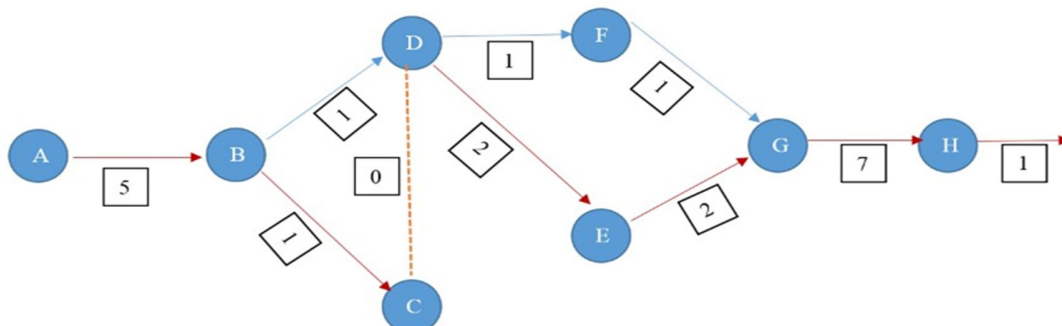5) One dummy is given between Activity C and D which time duration is zero.
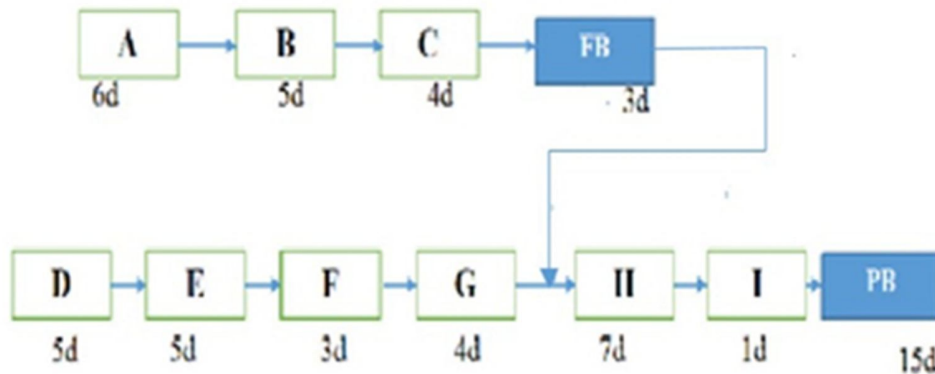

Figure 3 CPM network diagram

D. CCPM Chart

Figure 4 CCPM network diagram

1) All resources equipment and labours manage one activity at starting point.
2) I can try 3 to 4 Critical Chain but considering lake of resources and effect of environment this critical path suggest best way to complete it.
3) By using this path project completion on time and budget remaining same.
4) Here is given CCPM chart above.
5) Activity A, B, C are non-critical and feeding buffer giving at the end of them.
6) The duration of feeding buffer is 3 days.
7) Activates D, E, F, G, H, I on the critical path.
8) Project buffer should be given at the end of critical path and its duration is 15 days

IV. CONCLUSION

Time is most important factor nowadays. Many projects in India should not complete on time. CCPM can apply on overall project as it depends on resource availability and use of constrain the result should be completion time of project is 50 days with the help of Feeing buffer and gives 15 days project buffer.it should be help to complete the project at time and budget remaining same.

CPM method is applied on some part of the running project which gives 18 days of critical path. It depended on activity duration and dependency of each of activity.

Experimentally it is shown through the simulation results that CCPM performs better than other traditional approaches. It is recommended that CCPM approach should be used by construction industry also to achieve their targets within time.

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