

USE OF CRASHING CPM NETWORK IN SCHEDULING PROJECT MANAGEMENT TO COMPLETE THE PROJECT ON TIME

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Abstract— The discipline which provides the managers to organize, track monitor and control the resource, project completion duration, the project cost and the project quality is called project management. The piece of project management which administrates the use of schedules like GC, CPM/PERT to plan and focus the improvement inside the project environment is project scheduling. This controls the project on assigning which task has to be performed for projects and decides the deadlines of these project completions. A project scheduler decides how long a project has to take and when it has to be completed.

Keywords—*Critical path method, Program evaluation*

I. INTRODUCTION

The three main objective of any project will be Setting a paper completion time for the project, Completing the project with less budget, And not compromising with the quality of the project.

The Research Methodology

A CPM strategic planning process is studied for planning and developing the production plant for getting at a minimal cost at an optimal time to complete the project. The research will provide the project to analyze the project activity during all stages of the project, hence getting the maximum benefit at a less cost, duration and schedule management.

II. PROJECT SCHEDULING

The main purpose of project scheduling is to frame a table which tells when each particular activity starts and ends within the predefined activity. It is based on the traditional method to estimate earliest start time and or latest start schedule. Also it schedules calculation which yields with minimal project lead time in the schedule. The two

basic and traditional project scheduling are the CPM and PERT.

Network Methods:

Network Methods are based on network diagram to get the following

- 1.To schedule the initial and final time of each activity and have determined the entire project duration.
- 2.To find the allowable float slacks which do not maximize the duration of the project. But if delayed would prolong the project.

There are many network techniques like CPM, PERT, GERT, VERT look at two techniques.

Critical Path Method (CPM)

The critical path method which is also known as Critical Path Analysis (CPA) was created by DuDont Corporation and Remington Rand Corporation. It was improved to maintain power plant maintenance projects.

Program Evaluation and Review Technique (PERT)

This method was originally developed, where the technique of Taylor and Grant couldn't be applied. PERT is a particular case of CPM which has all the duration.

Pert and CPM Critical Path Methods

Get the activity list to obtain the project.

1. Find each activities immediate predecessors in the project.
2. Estimate each activities completion time.
3. Taking the activities and its immediate predecessors given in and to from a project network.
4. Estimate the ES and EF time for every activity using the project network and the activity time by using forward pass through earliest finish. Last activities time provides the total time to finish the project.

- Using the project finishing time calculated in previous step as the latest finish time of the last activity by backward pass identify the latest start and finish time of each activity.

To Determine individual activity actual duration

The estimated duration is the actual duration of each activity

Scheduling the production plan for crashing time

The plant project is analyzed to improve the working by reducing the time by crashing the time. The scheduling is investigated for this purpose. The given schedule has 14 different activities including different works.

The process is initiated to find its critical path and finds out the activities, determines the complete process time.

TABLE 1 ACTIVITY LIST OF THE PRODUCTION PLANT

S. No.	Activity	PREDECESSOR	ACTIVITY TIME
1.	M	None	25
2.	N	M	20
3.	O	N	12
4.	P	N	15
5.	Q	N	14
6.	R	O,P,Q	5
7.	S	R	4
8.	T	S	8
9.	U	T	5
10.	V	U	10
11.	W	V	20
12.	X	W,Y	30
13.	Y	W	15
14.	Z	X	20

Representation of the Project Network

A network represents all the activities of the project which is done in an order. It also depicts the predecessor and successor of each activity. These activities are represented by arrows.

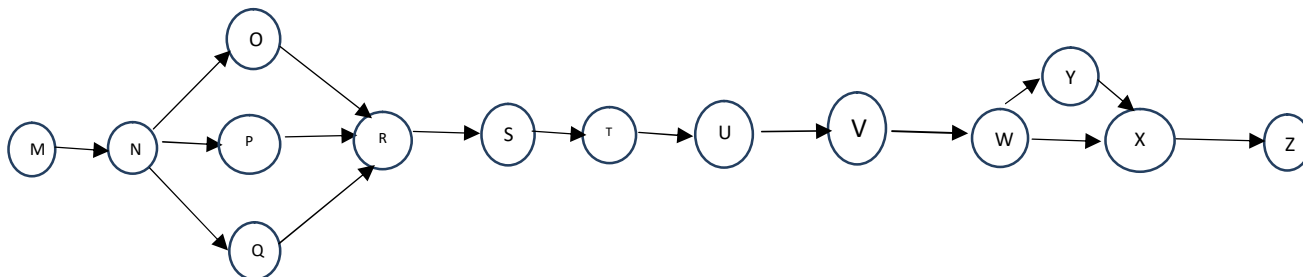


Fig. 1 Establishment of Critical path

The different paths in the projects are

M-N-O-R-S-T-U-V-W-X-Z

= 159

M-N-O-R-S-T-U-V-W-Y-X-Z

= 174

M-N-P-R-S-T-U-V-W-X-Z

= 162

M-N-P-R-S-T-U-V-W-Y-X-Z

= 177

M-N-Q-R-S-T-U-V-W-X-Z

= 161

M-N-Q-R-S-T-U-V-W-Y-X-Z

= 177

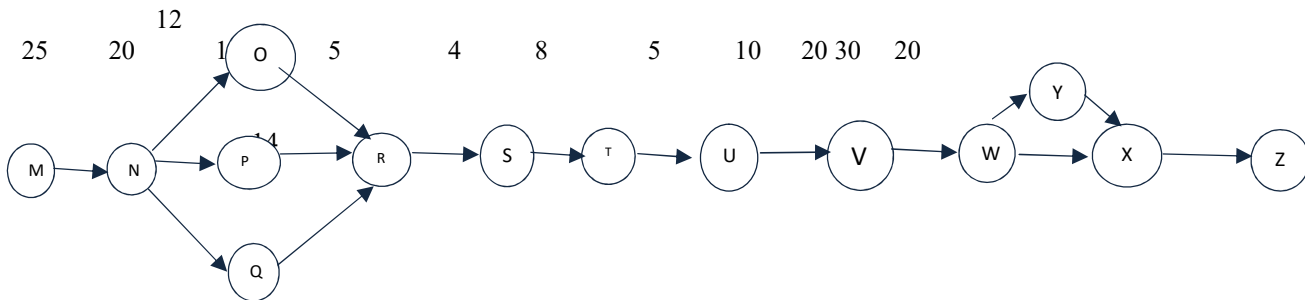


Fig.2 Network Diagram Showing Critical Path

Time Cost trade offs

The next step of the process is to determine the extra cost which would have to reduce the project duration.

Crashing a project means reducing its original number of activities, for crashing its activities to reduce the project duration then its original duration.

It refers to taking extra measures to lessen the project time duration below its normal value. These extra measures may be steps taken like

overtime or appointing additional help obtaining special machines etc.

CPM procedure of time and cost trade off is related with the unit activities need to be crashed so as to obtain the anticipated project duration.

Time cost trade graph for each activities gives the data required for such crashing. Time cost computations are given below and is calculated for all the activities on critical path. There is no cost reduction for activities F, G, H, I and L even though they are critical path.

Table II TIME AND COST FOR ACTIVITIES

Activity	PREVIOUS ACTIVITY	NT	CT	NC	CC	REDUCTION TIME	CRASH COST REDUCED
M	None	25	20	255	315	5	12.00
N	M	20	13	65	118	7	7.55
O	N	12	10	40	46	2	3.00
P	N	15	12	25	34	3	3.00
Q	N	14	12	15	22	2	3.50
R	O,P,Q	5	5	20	20	-	-
S	R	4	4	22	22	-	-
T	S	8	8	58	58	-	-
U	T	5	5	32	32	-	-
V	U	10	7	52	69	3	5.67
W	V	20	16	18	25	4	1.75
X	W,Y	30	30	30	30	-	-
Y	W	15	12	18	18	3	1.00
Z	X	20	15	225	225	5	9.00

The table gives the path and length of project network

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