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Experiment 5

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Project Title: Resort Property Management System

Aim: To perform PERT Analysis

PERT:

Program Evaluation Review Technique (PERT) is a project management planning tool used to calculate the amount of time it will take to realistically finish a project. PERT charts are used to plan tasks within a project — making it easier to schedule and coordinate team members.

PERT is a procedure through which activities of a project are represented in its appropriate sequence and timing. It is a scheduling technique used to schedule, organize and integrate tasks within a project. PERT is basically a **mechanism for management planning** and control which **provides a blueprint for a particular project**. All of the primary elements or events of a project have been finally identified by the PERT.

In this technique, a PERT Chart is made which represents a schedule for all the specified tasks in the project. The reporting levels of the tasks or events in the PERT Charts is somewhat same as defined in the work breakdown structure (WBS).

Characteristics of PERT:

1. It serves as a base for obtaining the important facts for implementing the decision-making.
2. It forms the basis for all the planning activities.
3. PERT helps management in deciding the best possible resource utilization method.
4. PERT takes advantage by using time network analysis techniques.
5. PERT presents the structure for reporting information.
6. It helps the management in identifying the essential elements for the completion of the project within time.

Advantages of PERT:

It has the following advantages :

1. Estimation of completion time of project is given by the PERT.
2. It supports the identification of the activities with slack time.
3. The start and dates of the activities of a specific project is determined.
4. It helps project manager in identifying the critical path activities.
5. PERT makes well organized diagrams for the representation of large amounts of data.

Disadvantages of PERT:

It has the following disadvantages :

1. The complexity of PERT is more which leads to the problem in implementation.
2. The estimation of activity time is subjective in PERT which is a major disadvantage.
3. Maintenance of PERT is also expensive and complex.
4. The actual distribution may be different from the PERT beta distribution which causes wrong assumptions.
5. It under estimates the expected project completion time as there are chances that other paths can become the critical path if their related activities are deferred.

Creating a PERT Chart

A flowchart is used to depict the Project Evaluation Review Technique. Nodes represent the events, indicating the start or end of activities or tasks. The directorial lines indicate the tasks that need to be completed, and the arrows show the sequence of the activities.

There are four definitions of time used to estimate project time requirements:

- Optimistic time (T_o)– The least amount of time it can take to complete a task
- Pessimistic time (T_p) – The maximum amount of time it should take to complete a task
- Most likely time (T_m) – Assuming there are no problems, the best or most reasonable estimate of how long it should take to complete a task.
- Expected time (T_e)– Assuming there are problems, the best estimate of how much time will be required to complete a task.

Z-Score Determination process:

Step1 Calculate expected completion time (T_E) (i.e. estimated activity duration) using PERT

$$T_E = (O+4M+P)/6$$

Step2 Calculate variance of the project by calculating the variance of each task/activity

$$\text{Task Variance } (\sigma^2) = [(P-O)/6]^2$$

Step3 Calculate the standard deviation

$$\text{Standard Deviation } (\sigma) = \sqrt{\text{Task Variance1} + \text{Task Variance2} + \text{Task Variance3}\ldots}$$

Step4 Calculate the Z-Score

To calculate the Z-Score use the equation:

$$Z = (T-T_E)/\sigma$$

The Z-Score (z) is the difference between the desired completion time (T) and the project's expected completion time (T_E) divided by the standard deviation (σ) for the project.

Step5 Calculate the probability of success now that you have figured out the Z-Score.

Translate that score (sigma value) into an actual percentage. This translation is done using a Z-Score table. Z-Score table is a pre-existing table that statisticians have already calculated for use with Z-Scores. The Z-Score contains the same values regardless of the application or industry.

Calculating parameters t_e and variance and standard deviation of each activity:

Here, a i.e. optimistic time and c i.e. pessimistic time are assigned randomly and b i.e. Most likely time is taken as the initial duration given in Gantt chart

Phase I

Task	a - Optimistic time	b - Most likely (Duration)	c - Pessimistic time	te - Expected time	Variance	Standard Deviation
Requirement Analysis	2	4	5	3.833	0.111	0.333
Defining Problem Statement	1	1	2	1.167	0	0
Defining Objectives and Features	1	2	3	2	0.028	0.167
Proposal Documentation	1	1	1	1	0	0
Project Proposal Approval	1	1	2	1.167	0	0
+ Add Task						
	6 sum	9 sum	13 sum	9.167 sum	0.139 sum	0.5 sum

Phase II

Task	a - Optimistic time	b - Most likely (Duration)	c - Pessimistic time	te - Expected time	Variance	Standard Deviation
Designing UI	4	7	10	7	0.25	0.5
Database connectivity and setup	1	2	3	2	0.028	0.167
Login-Signup Implementation	1	2	5	2.333	0.028	0.167
Implementation of User System	5	6	7	6	0.028	0.167
Implementation of Property System	4	6	8	6	0.111	0.333
Implementation of Booking System	5	6	6	5.833	0.028	0.167
Phase II Documentation and Presentation	1	1	2	1.167	0	0
+ Add Task						
	21 sum	30 sum	41 sum	30.333 sum	0.472 sum	1.5 sum

Phase III

Task	a - Optimistic time	b - Most likely (Duration)	c - Pessimistic time	te - Expected time	Variance	Standard Deviation
Implementation of Payment System	6	8	14	8.667	0.111	0.333
Implementation of Inventory Manageme...	7	9	10	8.833	0.111	0.333
Testing	5	6	12	6.833	0.028	0.167
Deployment	6	8	14	8.667	0.111	0.333
Phase III Documentation	2	5	10	5.333	0.25	0.5
Final Project Report Preparation	3	6	9	6	0.25	0.5
Final Presentation	2	6	8	5.667	0.444	0.667
+ Add Task						
	31 sum	48 sum	77 sum	50 sum	1.306 sum	2.833 sum

Critical Path Values Calculation (Te, Vp, Ts):

Critical Path Te, Vp, Ts values are same as the values of t_e, variance and most likely time i.e. duration only for the activities that are included in the critical path

Critical Path is A-B-C-D-E-F-J-K-L-M-N-O-P-Q-R-S

Phase I

Task	CP - Critical Path	Critical Path Te	Critical Path Vp	Critical Path Ts
Requirement Analysis	Yes	3.833	0.111	4
Defining Problem Statement	Yes	1.167	0	1
Defining Objectives and Features	Yes	2	0.028	2
Proposal Documentation	Yes	1	0	1
Project Proposal Approval	Yes	1.167	0	1
+ Add Task				
		9.167 sum	0.139 sum	9 sum

Phase II

Task	CP - Critical Path	Critical Path Te	Critical Path Vp	Critical Path Ts
Designing UI	Yes	7	0.25	7
Database connectivity and setup	No	0	0	0
Login-Signup Implementation	No	0	0	0
Implementation of User System	No	0	0	0
Implementation of Property System	Yes	6	0.111	6
Implementation of Booking System	Yes	5.833	0.028	6
Phase II Documentation and Presentation	Yes	1.167	0	1

Phase III

Task	CP - Critical Path	Critical Path Te	Critical Path Vp	Critical Path Ts
Implementation of Payment System	Yes	8.667	0.111	8
Implementation of Inventory Management	Yes	8.833	0.111	9
Testing	Yes	6.833	0.028	6
Deployment	Yes	8.667	0.111	8
Phase III Documentation	Yes	5.333	0.25	5
Final Project Report Preparation	Yes	6	0.25	6
Final Presentation	Yes	5.667	0.444	6
+ Add Task				
		50 sum	1.306 sum	48 sum

Z Value Calculation:

Te = Sum of Critical path Te values

Vp Sqrt = Sqrt of sum of critical path Vp values

Ts = Sum of Critical path Ts values

Z Value = (Ts - Te)/Vp

Te	Vp Sqrt	Ts
79.16666667	1.354006401	77
Z Value		
-1.600189383		

Z Score = 0.05480

This means that the data point falls 0.05480 above the mean since the value of z score is positive.

Conclusion:

Hence, we performed PERT Analysis for our project topic i.e. Resort Property Management System and found out the Z score to be 0.05480 which is positive and hence the data point falls above the mean.

References:

https://successfulprojects.com/pm-topics/time-mgmt/