EAST WEST UNIVERSITY

Task - 02 (CPM & PERT Analysis) on
Wholesale E-Commerce Website for Miskat International

Course Code: CSE347
Course Title: Information System Design and Analysis
Section: 03

Submitted By

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Introduction:

The development of a Wholesale E-Commerce Website for Miskat International involves multiple interdependent activities such as requirement analysis, system design, frontend and backend development, and testing. To effectively plan, schedule, and control these activities within the academic timeframe, Program Evaluation and Review Technique (PERT) has been applied.

PERT helps identify the critical activities, estimate project duration under uncertainty, and assess the probability of completing the project on time. This analysis supports better project decision-making and risk management.

Project Overview:

This PERT analysis is based on the proposed system described in the project proposal titled *"Wholesale E-Commerce Website for Miskat International."*

The project aims to digitalize wholesale order processing for an FMCG distributor in Bangladesh by developing a web-based platform using Node.js, Express.js, and MySQL. The system will improve order management, and expand business reach.

Activity Identification:

1. Requirement Collection & Analysis (A-C): Essential to understand wholesale pricing, bulk ordering, and stakeholder needs.
2. System & Database Design (D): Ensures scalability for large product and order volumes.
3. Learning Tools & Technologies (E): Required due to new frameworks and backend technologies.
4. Frontend & Backend Development (G, H): Core system implementation.
5. Testing & Validation (M, N): Ensures system reliability before deployment.

Duration of Activities and Predecessor Relationships:

Task ID	Task	Predecessor	Duration (days)
A	Understand Business & Problem	—	2
B	Requirement Collection	A	3
C	Requirement Analysis & Scope Finalization	B	2
D	System & Database Design	C	7
E	Learning Tools and Technologies	—	30
F	UI Design	D	5
G	Frontend Development	E, F	15
H	Backend Development	D, E	15
I	Simultaneous Review from Client 1	G, H	1
J	Database Implementation	D	3
K	Simultaneous Review from Client 2	J	1
L	Integrate Frontend & Backend	I, K	7
M	Testing & Bug Fixing	L	15
N	System Validation & Final Review	M	2

Project Network Diagram:

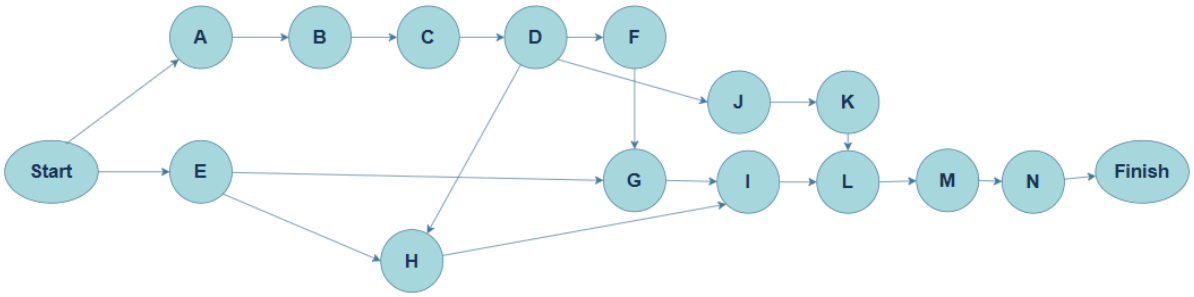

Figure 1.1: Project Network Diagram

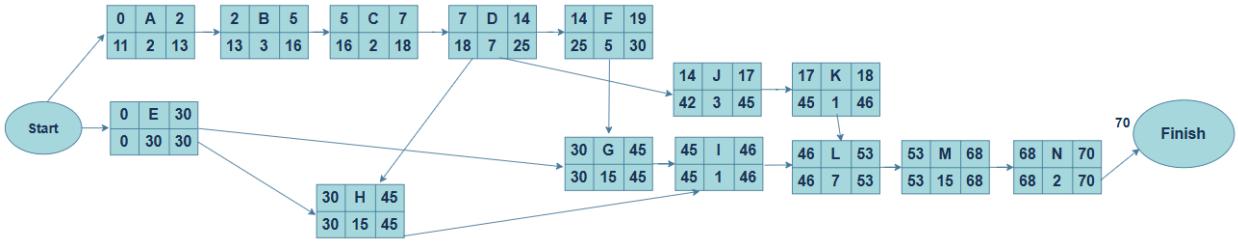

Figure 1.2: Project Network Diagram with Starting and Ending Time

The network diagram illustrates the logical sequence of project activities and their dependencies. Parallel execution of frontend and backend development allows better time utilization, while review tasks ensure continuous client feedback.

Non-Critical and Critical Paths from Network Diagram:

A-B-C-D-F-G-I-L-M–N = 59
A-B-C-D-H-I-L-M-N = 54
A-B-C-D-J-K-L-M-N = 42
E-G-I-L-M-N = 70 **(Critical Path)**
E-H-I-L-M-N = 70 **(Critical Path)**

Program Evaluation and Review Technique (PERT) Analysis:

Task ID	Predecessor	Duration (days)	Optimistic estimation (t_o)	Most Likely estimation (t_m)	Pessimistic estimation (t_p)	Expected Time (t_e) $\frac{to+4tm+tp}{6}$	Variance $\sigma^2 = (\frac{tp-to}{6})^2$
A	—	2	1	2	3	2	0.11
B	A	3	2	3	5	3.17	0.25
C	B	2	1	2	3	2	0.11
D	C	7	5	7	11	7.33	1.00
E	—	30	22	30	45	31.17	14.69
F	D	5	4	5	8	5.33	0.44
G	E, F	15	11	15	23	15.67	4.00
H	D, E	15	11	15	23	15.67	4.00
I	G, H	1	1	1	2	1.17	0.03
J	D	3	2	3	5	3.17	0.25
K	J	1	1	1	2	1.17	0.03
L	I, K	7	5	7	11	7.33	1.00
M	L	15	11	15	23	15.67	4.00
N	M	2	1	2	3	2	0.11

The analysis identifies **E–G–I–L–M–N** and **E-H-I-L-M-N** as the critical path with a total duration of **70 days**.

Activities on the critical path have zero slack, meaning any delay in these tasks will directly delay the overall project. In particular, Learning Tools and Technologies (Task E) has the longest duration and highest variance, making it the most risk-sensitive activity.

Expected Project Length: 70 Days
Critical Path: E-G-I-L-M-N and E-H-I-L-M-N
Project Length Variance, σ^2 = 14.69 + 4.00 + 0.03 + 1.00 + 4.00 + 0.11 = 23.83 days^2

Project Length Standard Deviation, $\sigma = \sqrt{Project\ Variance}$ = 4.88 days

The probability that the project will be completed in 75 days in given by P(Z ≤ D),
Standard Normal Variable, **Z** = $\frac{Ts - Te}{\sigma}$
where,

The scheduled time to complete the project, T_S = 75 days
Normal expected project length, T_e = 70 days
Expected standard deviation of the project, σ = 4.88 days

∴ **Z** = $\frac{75-70}{4.88}$ = **1.02**

z	.00	.01	.02	.03	.04
0.0	.5000	.5040	.5080	.5120	.5160
0.1	.5398	.5438	.5478	.5517	.5557
0.2	.5793	.5832	.5871	.5910	.5948
0.3	.6179	.6217	.6255	.6293	.6331
0.4	.6554	.6591	.6628	.6664	.6700
0.5	.6915	.6950	.6985	.7019	.7054
0.6	.7257	.7291	.7324	.7357	.7389
0.7	.7580	.7611	.7642	.7673	.7704
0.8	.7881	.7910	.7939	.7967	.7995
0.9	.8159	.8186	.8212	.8238	.8264
1.0	.8413	.8438	.8461	.8485	.8508
1.1	.8643	.8665	.8686	.8708	.8729

∴ **Probability ≈ 0.8461 ≈ 84.61%**

The probability of completing the project within **75 days** is **84.6%**, which indicates a high likelihood of success within the planned timeframe. This suggests that the project schedule is realistic and manageable under normal conditions.

Conclusion:

This PERT and critical path analysis provides a structured scheduling framework for developing the Wholesale E-Commerce Website for Miskat International. The identified critical path and probability analysis indicate that the project can be completed successfully within the academic semester.By focusing on critical activities and managing high-variance tasks, we can minimize delays and ensure efficient system development aligned with stakeholder expectations.

The End