Department of Computer Engineering

Academic Term: First Term 2023-24

Class: T.E /Computer Sem – V / Software Engineering

Practical No:	**6**
Title:	**Estimating Project Cost Using COCOMO Model**
Date of Performance:	**31/08/32**
Roll No:	**9590**
Team Members:	

Rubrics for Evaluation:

Sr. No	Performance Indicator	Excellent	Good	Below Average	Total Score
1	On time Completion & Submission (01)	01 (On Time)	NA	00 (Not on Time)	
2	Theory Understanding(02)	02(Correct)	NA	01 (Tried)	
3	Content Quality (03)	03(All used)	02 (Partial)	01 (rarely followed)	
4	Post Lab Questions (04)	04(done well)	3 (Partially Correct)	2(submitted)	

Signature of the Teacher:

Lab Experiment 06

Experiment Name: Estimating Project Cost Using COCOMO Model in Software Engineering

Objective: The objective of this lab experiment is to introduce students to the COCOMO

(Constructive Cost Model) estimation technique for estimating software project cost and effort.

Students will gain practical experience in using the COCOMO model to estimate the development

effort, duration, and resources required for a sample software project.

Introduction: COCOMO is a widely used algorithmic cost estimation model in software

engineering. It helps in quantifying the effort and resources needed for software development based

on project size, complexity, and other factors.

Lab Experiment Overview:

1. Introduction to COCOMO Model: The lab session begins with an introduction to the COCOMO

model, explaining the different versions (Basic, Intermediate, and Advanced) and their application

in software cost estimation.

2. Defining the Sample Project: Students are provided with a sample software project along with its functional and non-functional requirements, complexity, and size metrics.

3. COCOMO Parameters: Students learn about the COCOMO model parameters, such as Effort

Adjustment Factor (EAF), Scale Factors, and Cost Drivers, and how they influence the project's

effort estimation.

4. Effort and Duration Estimation: Using the COCOMO model formula, students estimate the effort

and duration required to complete the sample project based on the provided size and complexity

metrics.

5. Resource Allocation: Students estimate the number of required resources, such as developers,

testers, and project managers, based on the calculated effort and project duration.

6. Sensitivity Analysis: Students perform sensitivity analysis by varying the COCOMO parameters

to observe their impact on the project cost estimation.

7. Conclusion and Reflection: Students discuss the significance of COCOMO in software project

estimation and reflect on their experience in estimating project cost using the COCOMO model.

Learning Outcomes: By the end of this lab experiment, students are expected to:

Understand the COCOMO model and its application in software cost estimation.

Gain practical experience in using the COCOMO model to estimate effort, duration, and resources

for a software project.

Learn to consider various project factors and adjust COCOMO parameters for accurate cost

estimation.

Develop estimation skills for resource allocation and project planning.

Appreciate the importance of data accuracy and project size metrics in project cost estimation.

Pre-Lab Preparations: Before the lab session, students should familiarize themselves with the

COCOMO model, its parameters, and the cost estimation formula. They should also review the factors that influence the project's size and complexity.

Materials and Resources:

Project brief and details for the sample software project

COCOMO model guidelines and cost estimation formula

Calculators or spreadsheet software for performing calculations

Conclusion: The lab experiment on estimating project cost using the COCOMO model provides

students with practical insights into software cost estimation techniques. By applying the COCOMO

model to a sample software project, students gain hands-on experience in assessing effort, duration,

and resource requirements. The sensitivity analysis allows them to understand the impact of various

factors on cost estimation. The lab experiment encourages students to use COCOMO in real-world

scenarios, promoting informed decision-making in software project planning and resource allocation.

Accurate cost estimation using COCOMO enhances project management and contributes to the successful execution of software engineering projects.

COCOMO MODEL FOR PROJECT PLANNING

- **Project Scope:** Develop a gas leakage detection system with basic features for a small industrial facility.
- **Size Metric:** Use lines of code (LOC) as the size metric.
- **Development Team:** A team of 4 developers.
- **Development Environment:** Use modern development tools and practices.

Step 1: Define the Size of the Project Suppose you estimate that the gas leakage detection system will require approximately 10,000 lines of code (LOC).

Step 2: Select the COCOMO Model Choose the Intermediate COCOMO model since it provides a good balance between simplicity and accuracy.

Step 3: Determine Cost Drivers Identify relevant cost drivers based on your project's characteristics. In this example, you might consider:

- Product Complexity: Low
- Development Team Experience: Medium
- Modern Development Tools: Yes
- Required Software Reliability: Nominal
- Project Schedule: Normal

Step 4: Assign Ratings to Cost Drivers Assign appropriate ratings to each cost driver. For example:

- Product Complexity: Low (0.9)
- Development Team Experience: Medium (1.1)
- Modern Development Tools: Yes (0.9)
- Required Software Reliability: Nominal (1.0)
- Project Schedule: Normal (1.0)

Step 5: Calculate Effort Use the COCOMO formula to calculate the effort:

Effort (in Person-Months) = A * (Size in LOC)^B * EAF

Where:

- A and B are constants based on the COCOMO model.
- EAF (Effort Adjustment Factor) is the product of cost driver ratings.

Suppose A = 2.4 and B = 1.05 (these values are typical for the Intermediate COCOMO model).

Effort = 2.4 * (10,000 LOC)^1.05 * (0.9 * 1.1 * 0.9 * 1.0 * 1.0) = 25.74 Person-Months

Step 6: Estimate Duration Estimate the project duration based on the effort and the size of the team:

Project Duration (in months) = Effort / Team Size

Project Duration = 25.74 Person-Months / 3 Developers = 8.58 months

Step 7: Calculate Cost Calculate the cost of the project based on the effort and labor rates for the development team. Suppose the average monthly labor cost per developer is Rs.5,000.

Project Cost = Effort * Cost per Person-Month

Project Cost = 25.74 Person-Months Rs.5,000/Person-Month = Rs.128,700

Step 8: Adjust for Inflation and Contingencies Consider factors like inflation and contingency reserves based on your project's specific circumstances. For simplicity, let's assume no additional adjustments in this example.

Step 9: Review and Refine Review the estimate with relevant stakeholders and refine it as needed based on feedback and additional information.

So, in this simplified example, the estimated cost for developing a gas leakage detection system is approximately Rs.128,700 over a duration of about 8.58 months. Keep in mind that this is a basic example, and real-world projects may involve more complex factors and uncertainties that require further analysis and adjustment of the cost estimate.