**Learning Journal**

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**Course:** SOFTWARE PROJECT MANAGEMENT

**Journal URL:** https://github.com/divyasri5i0/SPM-Winter2025

**Dates Rage of activities**: [WEEK-2] 27 JAN 2025 – 9 FEB 2025

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**Key Concepts Learned**:

* Understood the importance of effort and cost estimation in software project management. It involves predicting the amount of effort - usually the number of people working on it per day/hour and the cost in terms of resources, salaries and tools required to complete a project.
* It is a critical process to ensure project feasibility, budget and timely delivery.
* Learned about effort and cost estimation which can be done using experience-based techniques and algorithmic cost modelling.
* Experience-based techniques: divided into two types

1. Estimation by Analogy – compare similar past projects to determine the size measure
2. Estimation by Expert Judgement – This estimation is done by expert judgements based on previous projects. Effort estimation using this technique is done using different methods:

* Function Point Analysis – This is done in 5 steps:

1. Determining function count type

b. Boundary and scope of count

c. Calculating unadjusted function point count

d. Applying adjusted factor

e. Calculating adjusted function point count

* Delphi – each team member estimates pieces of project individually and meet up to discuss and compare them
* Algorithmic cost modelling: cost is estimated as a mathematical function

Effort = A \* \* M

A – constant, B – disproportionate efforts of large functions, M - multiplier

* Algorithmic cost modelling can be done using COCOMO 2 which has 4 sub models:

1. Application composition model

2. Early design model

3. Reuse model

4. Post-architecture model

Keywords – Person months, effort multipliers, exponent driver factors, development

flexibility, risk resolution, team cohesion, process maturity.

* Learned about Risk – the combination of probability of an event and its negative consequences.
* Risk in a software project can affect product quality and rate of production. So, risk assessment should be done to avoid them. It involves 3 steps:
* Risk Identification
* Risk analysis
* Risk Prioritization
* Major causes of risks on projects:
* Bad negotiation
* Cost constraints
* Quality constraints
* Resource un-availability
* Source creep
* Human Error
* Poor Management
* Major risk types on projects:
* Resource Risk
* Technology Risk
* Budget Risk
* Quality Risk
* Time Risk
* Risk Control
* Risk Planning – can be performed at development and iteration
* Risk Resolution – Identifying the potential risks and tackling them
* Risk Monitoring – can be performed throughout the project development
* There are several risk response strategies that I noticed which will help to handle potential risks in a project:
* Acceptance – current project plan remains unchanged & deal risk
* Avoidance – changing the project plan to avoid/eliminate risks
* Risk transfer – shifting the consequence of a risk to a third party
* Mitigation – reduces the probability and/or consequences of an adverse risk to an acceptable level
* Risk Reduction Leverage – It helps organizations determine whether investing in a risk reduction measure is financially justified by comparing the cost of mitigation with the expected reduction in risk exposure.

Risk Reduction Leverage (RRL) =

RRL > 1: cost effective risk reduction measure

RRL < 1: non cost effective risk reduction measure

**Application in Real Projects:** **(Effort and cost estimation)**

* Project managers can use previous projects with similar characteristics to estimate the effort and cost of new projects. This includes comparing size measurements, identifying similarities, and accounting for differences.
* Utilizing these methods enables project teams to make well-informed choices, establish achievable expectations, and efficiently allocate resources, all of which support effective project execution. Continuously revising and enhancing these estimates throughout the project's duration helps to ensure precision and modify plans accordingly.

Examples:

1. Software Development Projects

Scenario: Developing an AI-Based Academic Advisor Software

Project Goal: Build an AI-driven system to help students choose courses and career paths.

Estimation Approach:

Effort Estimation: Use Function Point Analysis (FPA) to estimate the complexity of different software components.

Cost Estimation: Apply the COCOMO Model to predict development costs based on estimated effort.

1. Game Development (Using COCOMO Model)

Scenario: Developing an Open-World RPG Game

Effort Estimation: Use the COCOMO Model based on estimated lines of code (LOC).

Example Calculation:

Estimated LOC: 1,000,000 = 1000 KLOC

COCOMO Basic Model Formula:

Effort=2.4×= 2.4=3,500 person-months

If each developer costs $8,000/month, then the total cost = $28 million

* Risk Reduction Leverage (RRL) is widely applied in real-world projects to optimize risk management strategies. It is used in IT and software development, health care etc…

**Peer Interactions:**

* peer-to-peer interaction helped in understanding the concept in a better way which is so helpful for overall subject analysis.
* Peer interactions not only brushed up my knowledge but also helped me in improving my communication skills.
* We discussed which estimation technique works better for our project – COCOMO model, FPA, Delphi
* We tried to apply the concepts of lectures like effort estimation techniques and risk analysis in our project so that we can easily build the project and avoid risks.
* We also discussed how do you handle scope changes that impact effort and cost.
* We worked on the Topic Analysis together and created a presentable posture with relevant pictures and content. This gave me confidence that I can work well in teams and contribute my work.
* This encouraged open discussions and knowledge sharing among us.

**Challenges Faced:**

* COCOMO model was difficult to understand at first but went through some videos and contents online for a better understanding.
* Then I wanted to apply it for my project – **“AI as Academic advisor”.** Since, I am in my beginning stage of project I managed to understand the requirements, possibility, scope, budget and time constraints for the project.
* At this stage I am confused to choose one Effort Estimation technique among FPA, COCOMO II, Delfi for my project.
* So, I did a clear study and research on the requirements of my project and realized that the best approach is a **Hybrid Estimation Model** combining: 1) Function Point Analysis (FPA) for general software effort

2) COCOMO II for AI complexity adjustment

3)Machine Learning-Specific Estimation for AI model training & tuning

Why?

* **FPA** - suitable for estimating software UI, APIs, database interactions.
* **COCOMO** **II** - Uses an effort adjustment factor (EAF) to model uncertainty in AI projects.
* **ML** – data collection, pre-processing, modelling and training

**Personal Development Activities:**

* Spending time on reading Lecture notes which is making Lecture Journals easy to finish and also giving me better understanding about Software Project Management, day by day.
* This knowledge and peer interactions helped me to give a good presentation and score well in my recent topic Analysis where I clearly made 6 relevant and valid points for the posture.
* Connecting to peers developed my communication skills which helped me personally develop as a good presenter and speaker.
* Started to connect with people which is helping me improve my way of thinking broadly and improve my performance.
* These Lecture journals not only helped me to gain knowledge in SPM but also motivated me to spend at least 2-3 hrs a day journaling on other subjects as well, which made it easy for me to tackle tests and assignments.

**Goals for the Next Week:**

* I want to master project estimation techniques.
* Next week I want to primarily focus on my deep understanding of project and work towards Project deliverable 2.
* I want to go through chapter 5,6 to grasp the topics.
* I want to make notes for chapter 7 and 8 for this subject to improve my performance in upcoming Learning Journals and class activities.