# **SPM Analysis Tools Project Report**

## **Project Title**

Software Project Management Analysis Tools

## **Student Name(s)**

Rutwik Butani

## **Enrollment No(s)**

202203103510304

## **Course & Semester, Division**

Software Project Management (SPM)

Semester 6, Division D

## **Branch**

B.Tech Computer Engineering (Software Engineering)

## **Submission Date**

April 8, 2025

## **Objective**

The objective of this project is to develop a comprehensive suite of Software Project Management analysis tools that assist project managers in making informed decisions about project planning, resource allocation, and cost management. The application provides:

1. \*\*Renewable Energy Project Analysis\*\* - To evaluate and compare renewable energy projects based on ROI, NPV, and IRR calculations
2. \*\*Software Productivity Analysis\*\* - To track and measure software development productivity across multiple projects
3. \*\*PERT Analysis\*\* - To estimate task durations using the Program Evaluation and Review Technique
4. \*\*Precedence Network\*\* - To visualize project task dependencies and critical paths

## **Code Snippets for Key Functions**

### **ROI Calculation**

// From utils/calculations.js  
export const calculateROI = (netProfit, investment, duration) => {  
 const averageAnnualProfit = netProfit / duration;  
 return (averageAnnualProfit / investment) \* 100;  
};

### **NPV Detailed Calculation**

// From app.py and reimplemented in frontend  
export const calculateNPVDetailed = (initialInvestment, annualCashflow, discountRate, duration) => {  
 const rate = discountRate / 100;  
 let npv = -initialInvestment;  
 const yearlyData = [];  
   
 for (let t = 1; t <= duration; t++) {  
 const discountFactor = 1 / Math.pow(1 + rate, t);  
 const discountedCashflow = discountFactor \* annualCashflow;  
 npv += discountedCashflow;  
 yearlyData.push([t, parseFloat(discountFactor.toFixed(4)), parseInt(discountedCashflow)]);  
 }  
   
 return { npv, yearlyData };  
};

### **PERT Expected Time Calculation**

// From PERTCalculator.tsx  
const expectedTime = (optimistic + 4 \* mostLikely + pessimistic) / 6;

### **Project Productivity Calculation**

// From utils/calculations.js  
export const calculateProductivity = (sloc, workMonths) => {  
 if (workMonths <= 0) return 0;  
 return sloc / workMonths;  
};

## **Tools/Technologies Used**

### **Frontend**

* \*\*React\*\* - JavaScript library for building user interfaces
* \*\*TypeScript\*\* - Typed superset of JavaScript for improved developer experience
* \*\*Tailwind CSS\*\* - Utility-first CSS framework for rapid UI development
* \*\*React Hot Toast\*\* - Notification library for React
* \*\*Lucide React\*\* - Icon library for React applications

### **Backend**

* \*\*Flask\*\* - Python web framework for the backend server
* \*\*NumPy Financial\*\* - Library for financial calculations in Python

### **Deployment**

* \*\*Vercel\*\* - Platform for frontend deployment
* \*\*Docker\*\* (potentially) - For containerization

### **Development Tools**

* \*\*npm\*\* - Package manager for JavaScript/TypeScript dependencies
* \*\*Vite\*\* - Modern frontend build tool
* \*\*ESLint\*\* - JavaScript/TypeScript linting tool
* \*\*PostCSS\*\* - Tool for transforming CSS with JavaScript

## **Inputs Used for Testing New Features (Screenshots)**

### **Renewable Energy Analysis Input**

![Renewable Energy Input Form](https://example.com/renewable-input.png)

\*Screenshot showing the input form for Solar and Wind project analysis with sample values\*

### **Productivity Analysis Input**

![Productivity Analysis Input](https://example.com/productivity-input.png)

\*Screenshot showing the productivity tracking form with sample project data\*

### **PERT Analysis Input**

![PERT Calculator Input](https://example.com/pert-input.png)

\*Screenshot showing the PERT calculator form with sample task estimates\*

## **Screenshots of the Output**

### **Renewable Energy Analysis Results**

![Renewable Energy Results](https://example.com/renewable-results.png)

\*Screenshot showing comparative results between Solar and Wind projects, including ROI, NPV, and IRR calculations\*

### **Productivity Analysis Results**

![Productivity Results](https://example.com/productivity-results.png)

\*Screenshot showing productivity metrics across multiple software projects\*

### **PERT Analysis Results**

![PERT Results](https://example.com/pert-results.png)

\*Screenshot showing calculated expected times based on PERT analysis\*

## **Future Scope**

The application has several areas for future enhancement:

1. \*\*Precedence Network Diagram\*\* - Fixing and improving the visualization of the precedence network diagram to better represent task dependencies
2. \*\*PERT Evaluation Enhancement\*\* - Adding the diagram functionality for PERT analysis to visualize the critical path
3. \*\*Integration with Project Management Tools\*\* - Adding API integration with tools like Jira, Trello, or Microsoft Project
4. \*\*Machine Learning Integration\*\* - Implementing predictive analytics for better project estimations based on historical data
5. \*\*Mobile Application\*\* - Developing a companion mobile app for on-the-go project management
6. \*\*Multi-user Collaboration\*\* - Adding features for team collaboration and real-time updates
7. \*\*Expanded Financial Analysis\*\* - Including more financial metrics for project evaluation
8. \*\*Custom Dashboard\*\* - Creating a customizable dashboard for project managers to monitor multiple projects

The primary immediate focus will be on fixing the Precedence Network diagram and adding the diagram for PERT Evaluation to enhance the project planning capabilities of the application.