Project Report – Economic Analysis Tool for Software Projects

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1. Introduction

Software projects often involve significant uncertainty in cost, return, and risk. Our goal was to design a simple web application that helps stakeholders make better economic decisions throughout the software development lifecycle. This project was developed as part of a school assignment and focuses on three main pillars: **cost estimation**, **financial analysis**, and **risk assessment**.

2. Project Purpose

The tool is designed to assist project managers, developers, and stakeholders b :

- Estimating development effort and time using the COCOMO model
- Evaluating the economic viability of a project with financial metrics (ROI, NPV, Payback Period)
- Identifying and categorizing project risks based on impact and probability

It is intended as a lightweight tool for classroom use or small team projects.

3. Technologies Used

The application is built using:

- **Python (Flask)**: to handle the backend logic and calculations
- **JavaScript (Vanilla)**: for frontend interactions and dynamic updates
- **HTML/CSS**: for a responsive and user-friendly interface

All logic runs in real-time, entirely client-side. No database is used, and no user data is stored.

4. Functional Modules

4.1 Cost Estimation – COCOMO

We implemented the **Basic COCOMO** model (Barry Boehm, 1981) to estimate:

- Development effort (person-months)
- Development time (months)
- Team size (staff)

The user inputs the number of KLOC (thousands of lines of code) and selects the project type (Organic, Semi-detached, Embedded). The formulas used are:

- `Effort = a × (KLOC)^b`
- `Time = 2.5 × Effort^0.38`
- `Staff = Effort / Time`

This helps teams understand project complexity and plan resources accordingly.

4.2 Financial Analysis – ROI, NPV, Payback

This module allows users to evaluate if a software project is economically viable by computing:

- **ROI (Return on Investment)**
- **NPV (Net Present Value)**
- **Payback Period**

The tool requires inputs such as cost, annual benefits, duration, and discount rate. It returns all three indicators in real time, helping teams compare alternatives.

4.3 Risk Assessment – Risk Matrix

We implemented a **probability-impact matrix**, where users rate each risk from 1 to 5 in both dimensions:

- **Probability** (chance of occurrence)
- **Impact** (severity)

The risk score is computed as:

```
Score = Probability × Impact
```

The result is categorized:

- 1–5: Low risk
- 6–15: Medium risk
- 16–25: High risk

This helps teams prioritize what to monitor or mitigate.

5. User Interface and Workflow

The tool is organized into three tabs, one for each module. Users simply:

1. Select a tab (COCOMO, Financial, or Risk)
2. Input their project data
3. Click "Calculate"
4. Optionally generate a PDF summary report

The interface is intentionally minimal, making the app intuitive and accessible.

6. Challenges Faced

Several challenges were encountered:

- Running all calculations in real-time with no persistent backend
- Making complex economic models usable for non-expert users
- Designing a minimal interface while preserving all necessary functionality

7. Future Improvements

To make the tool more powerful, we identified potential improvements:

- Enable data saving and project history
- Allow multiple project comparisons
- Add graphical visualizations (charts, evolution curves)
- Export data in CSV or Excel format

8. Conclusion

This project demonstrates how economic decision-making can be simplified through a well-designed software tool. Though developed in an academic context, the application can serve as a valuable support for basic project planning, training, and risk analysis.

We learned a lot about economic modeling, front-end/backend integration, and designing for usability — and we look forward to expanding the tool in the future.