1. # User Manual for Software Project Economic Analysis and Decision-Making Tool

1. System Introduction

1.1 System Overview

The Software Project Economic Analysis and Decision-Making Tool is an interactive software designed to assist software engineering teams in evaluating economic decisions throughout the Software Development Life Cycle (SDLC). The tool integrates four core modules—Cost Estimation, Budget Management, Risk Management, and Resource Optimization—to provide data-driven decision support for project stakeholders.

1.2 Technology Stack

- Frontend Framework: React + TypeScript + Vite
- Backend Framework: Node.js
- Visualization Technology: chart.js
- Database: MySQL

1.3 System Access

1. Ensure Node.js (v14+) and npm are installed in the local environment.
2. Clone the project repository.
3. Execute `npm install` in the project root directory to install dependencies.
4. Run `npm run dev` to start the development server.
5. Access `http://localhost:5000` in a browser.

2. Quick Start

2.1 System Login

1. Open the browser and visit the system homepage.
2. Enter the registered email and password on the login page.
3. Click the **Login** button.
4. For first-time use, click **Register here** to create an account.

2.2 System Navigation

The top navigation bar after login includes the following modules:

- **Economics Estimation**: Cost estimation module
- **Budgeting & Cost Management**: Budget and cost management
- **Risk Management**: Risk management

- **Resources Allocation**: Resource allocation and optimization

3. User Guide for Cost Estimation Module

3.1 Function Overview

Supports multiple cost estimation methods, including the COCOMO model, Function Point Analysis, Expert Judgment, etc., allowing input of project attributes and comparison of outputs from different models.

3.2 COCOMO Model Estimation Steps

1. Go to the **Economics Estimation** module.
2. Select **COCOMO** under **Empirical Estimation Methods**.
3. Enter the following parameters:
   - `kloc`: Kilolines of code (e.g., 50)
   - `cost_per_pm`: Cost per person-month (e.g., 12000)
   - `mode`: Project mode (organic/semi-detached/embedded)
   - Other coefficients: RELY/DATA/CPLX/TIME/STOR (default values can be kept unchanged).
4. Click the **Calculate** button.
5. View estimation results, including effort, development time, and total cost.

3.3 Multi-Model Comparison

1. Select the **Compare Models** tab on the cost estimation page.
2. Check the models to compare (e.g., COCOMO, Function Points).
3. Enter project parameters.
4. The system automatically generates a comparison chart of results from each model.
5. View model deviations through the `DiffFromAverage` indicator.

4. Budget and Cost Management Module

4.1 Financial Indicator Calculation

1. Go to the **Budgeting & Cost Management** module.
2. Click **Financial Metrics Calculator**.
3. Enter the following parameters:
   - Initial Investment
   - Cash Flows for each period
   - Discount Rate
4. The system automatically calculates:
   - ROI (Return on Investment): `(Total Income - Total Investment) / Total Investment * 100%`

- NPV (Net Present Value): `Σ(Cash Flow / (1 + Discount Rate)^t) - Initial Investment`
- IRR (Internal Rate of Return): Calculated using the Newton-Raphson method
- Payback Period

4.2 Budget Tracking

1. Click **Create New Budget** on the budget management page.
2. Enter basic budget information (project name, total amount, time range).
3. Add budget items (Category/Planned Amount).
4. Update actual expenses regularly (Actual Amount).
5. The system automatically calculates deviations and generates trend charts.

5. Risk Management Module

5.1 Sensitivity Analysis

1. Go to the **Risk Management** module.
2. Select **Sensitivity Analysis**.
3. Enter the following parameters:
   - Base Value: e.g., 10000
   - Variations: -20% to +20%
4. Click **Calculer Sensitivity**.
5. View result changes under different variables (e.g., impact of development cost fluctuations).
6. The system generates a sensitivity analysis chart identifying key variables.

5.2 Monte Carlo Simulation

1. Select **Monte Carlo** on the risk management page.
2. Enter the following parameters:
   - Number of Simulations (Nombre de tirages): Recommended 1000
   - Minimum Cost (min): e.g., 8000
   - Maximum Cost (max): e.g., 12000
3. Click **Calculer Monte Carlo**.
4. View simulation results:
   - Mean (Moyenne)
   - Standard Deviation (Écart-type)
   - Confidence Interval (95% Confidence Interval)
   - Probability distribution chart

6. Resource Allocation and Optimization Module

6.1 Scenario Analysis

1. Go to the **Resources Allocation** module.
2. Click **Add Scenario** to add a scenario.
3. Enter scenario information:
    - Scenario Name (e.g., "Chinese Version")
    - Duration (in days)
    - Daily Effort (in hours/day)
4. Click **Add Task** to add tasks.
5. Enter task parameters: effort, resource requirements.
6. Click **Analyze Scenarios** to generate analysis results.

6.2 Resource Leveling

1. Select **Resource Leveling** on the resource allocation page.
2. Upload the project plan (or enter the task list manually).
3. Set Resource Limits.
4. Click **Execute Leveling**.
5. The system automatically adjusts non-critical path tasks:
    - Resolves over-allocation of resources
    - Optimizes resource utilization
6. View the leveled resource Gantt chart and utilization graph.

7. Advanced Functions

7.1 Data Import/Export

1. Supports import of historical project data in CSV/Excel format.
2. Click **Import Data** on each module detail page.
3. Select the file and map fields.
4. Supports export of analysis reports in PDF/PPT format.
5. Click **Export Report** on the results page to select the format.

7.2 Custom Models

1. Go to System Settings (Settings).
2. Select **Custom Models**.
3. Enter the formula for the custom estimation model.
4. After saving, it can be used in the cost estimation module.

8. System Settings and Help

8.1 Account Settings

1. Click the user avatar in the upper right corner.
2. Select **Profile** to modify personal information.
3. Select **Change Password** to update the password.

8.2 Help Center

1. Click **Help** in the navigation bar.
2. View built-in help documentation (In-context help).
3. Access the online user manual (PDF/HTML).
4. Watch tutorial videos for typical cases (Tutorial Videos).

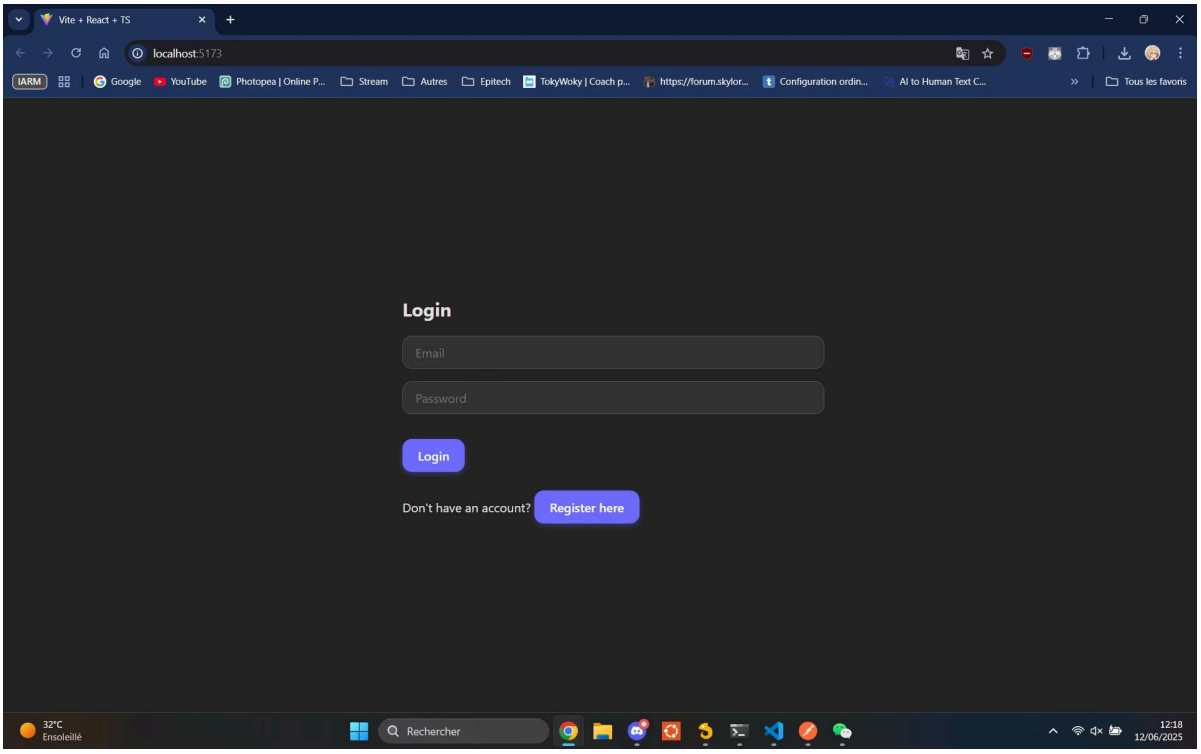
9. Troubleshooting

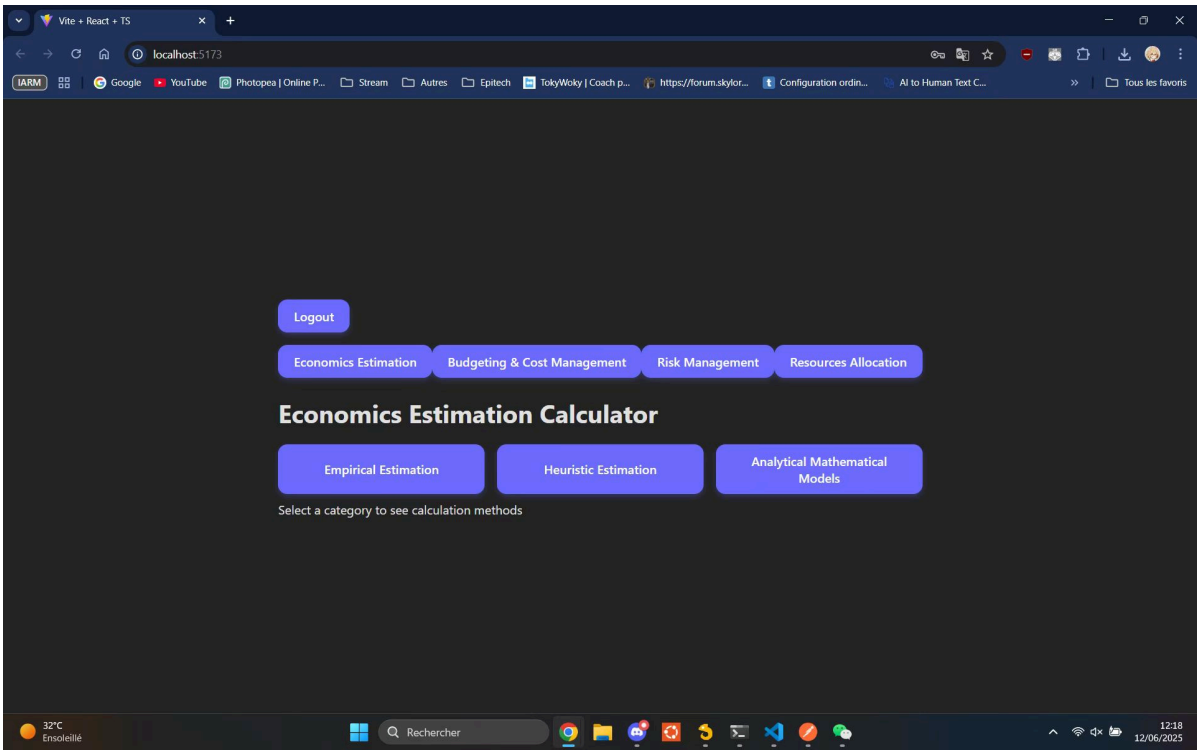
9.1 Common Issues

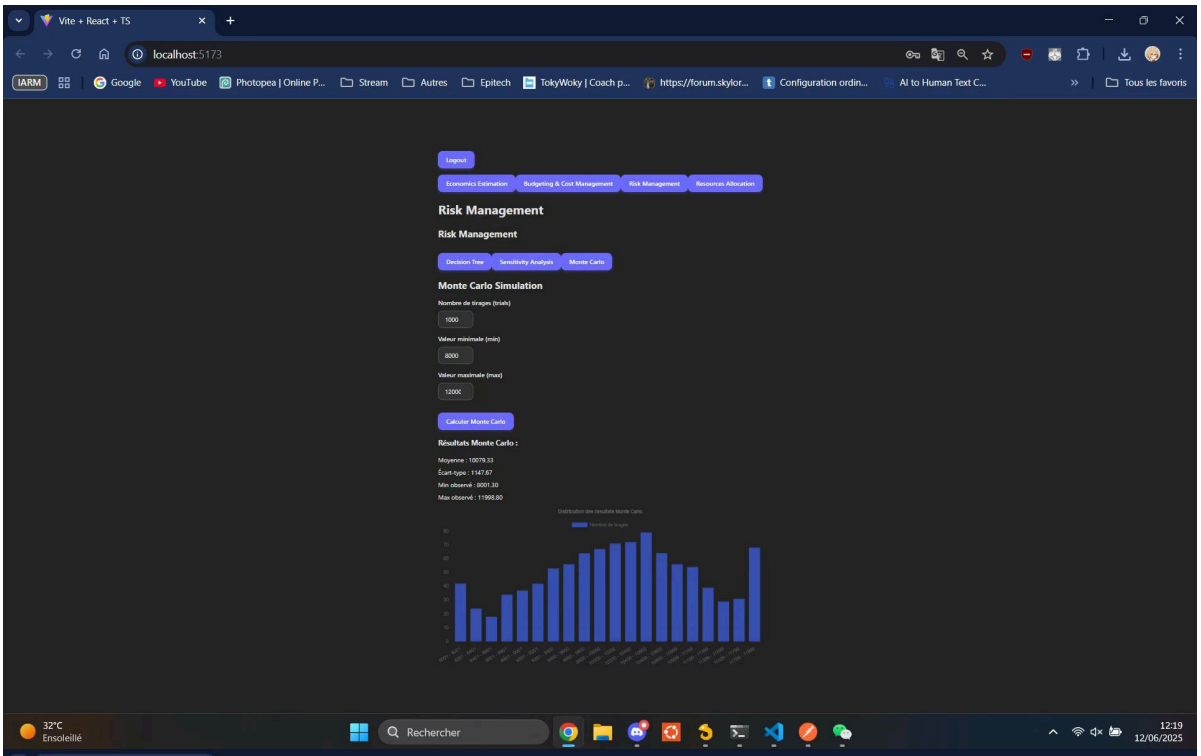
1. **Login Failure**: Ensure the email and password are correct; click **Forgot Password** to reset.
2. **Abnormal Calculation Results**: Check if input parameters are within a reasonable range (e.g., kloc > 0).
3. **Chart Loading Failure**: Refresh the page or check the network connection.

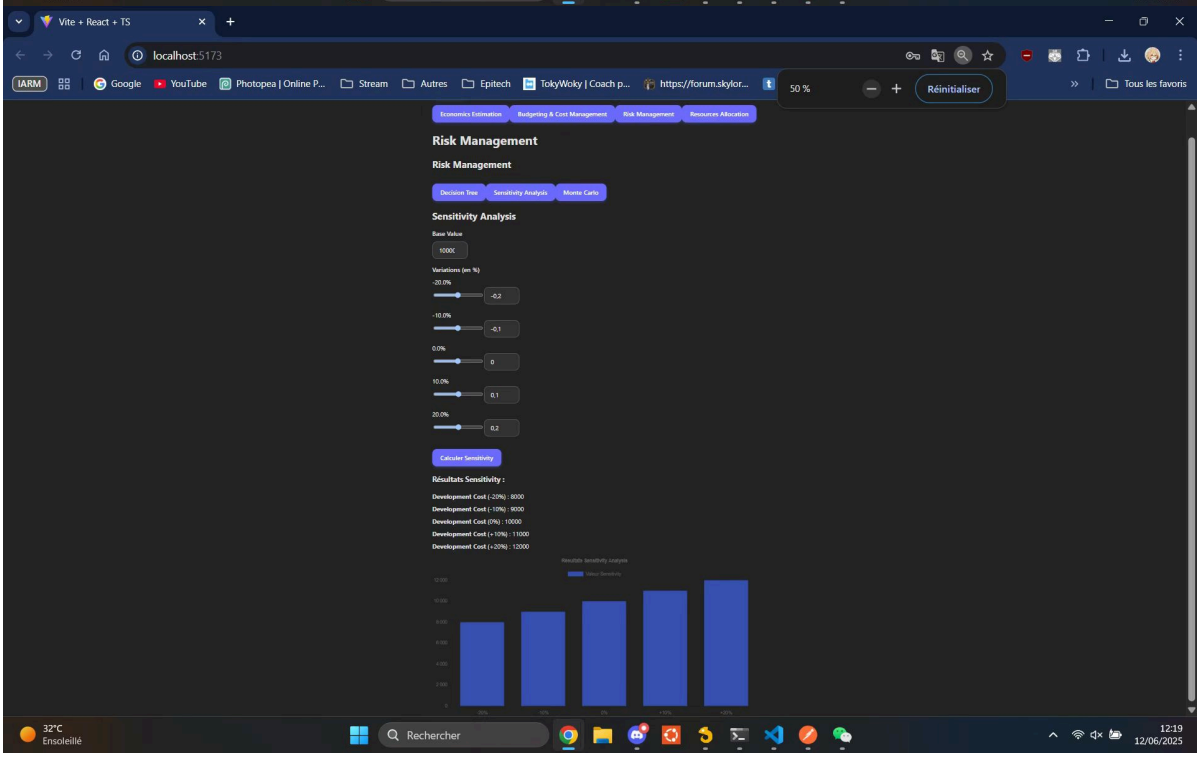
9.2 Performance Optimization

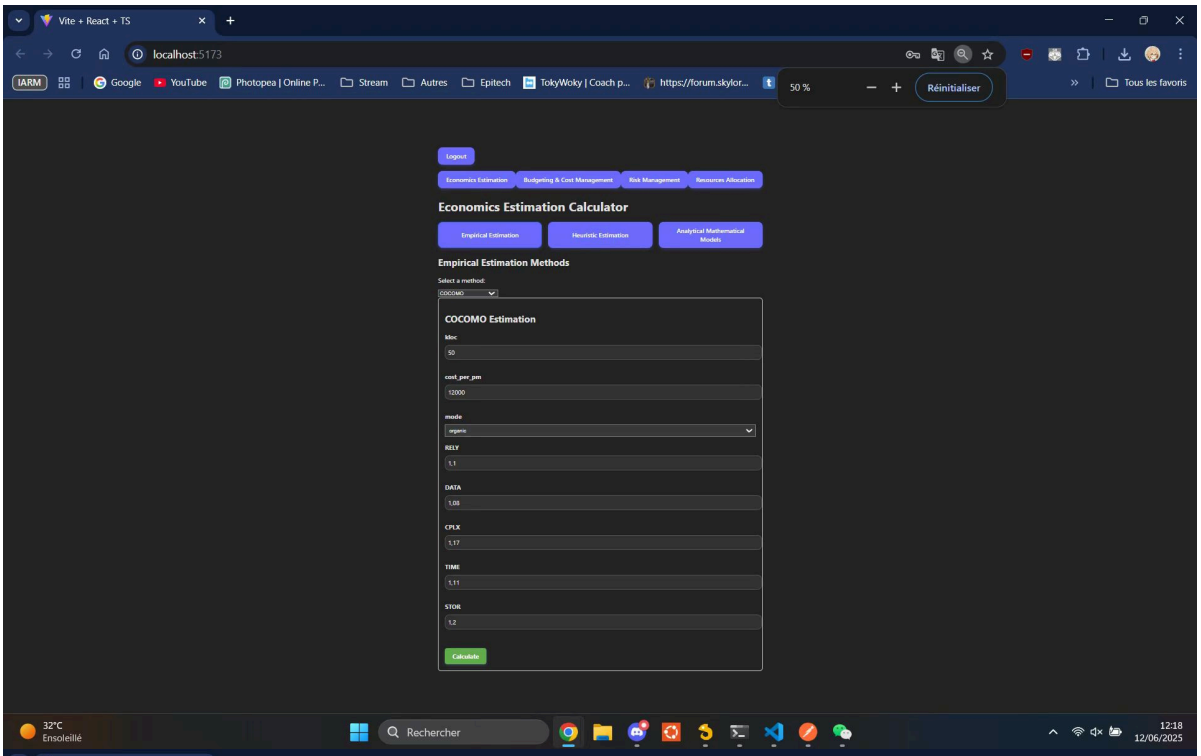
1. Long Monte Carlo simulation time: Reduce the number of simulations (default is 1000).
2. Slow system response: Close other resource-intensive applications.
3. Browser lag: Clear the cache or use the latest version of Chrome/Firefox.

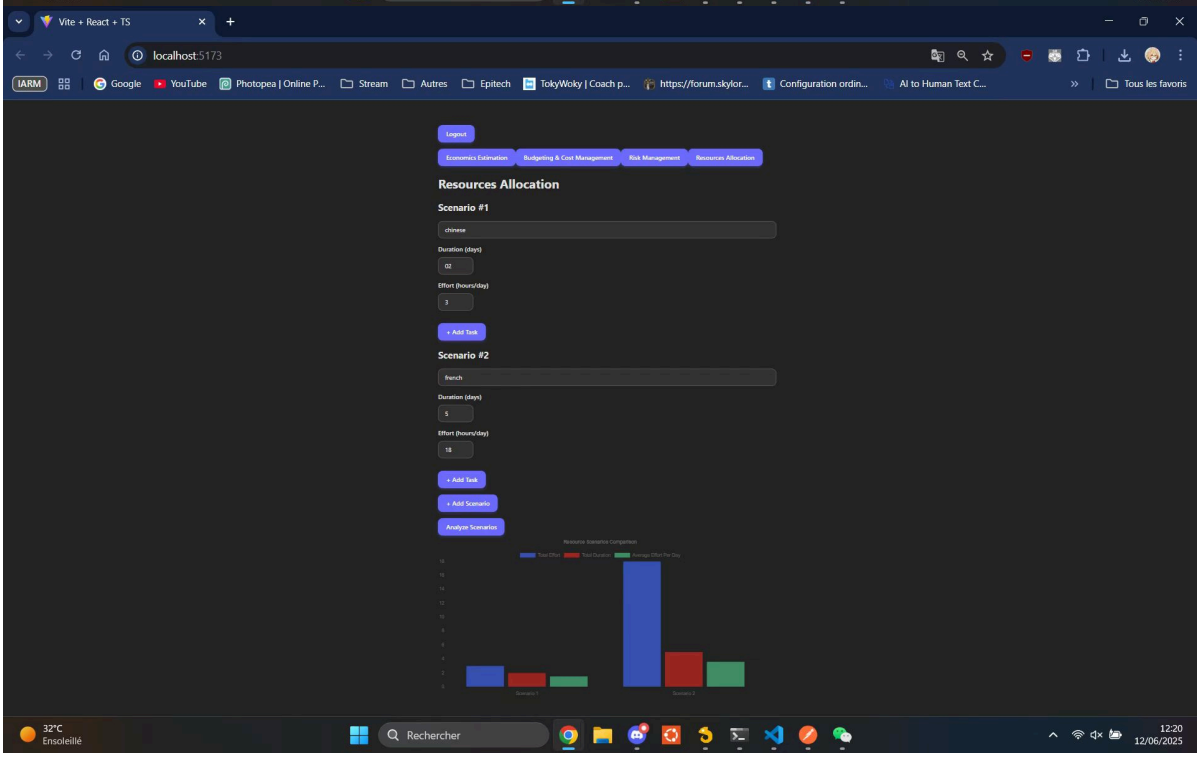



Vite + React + TS
localhost:5173
Logout
Economics Estimation
Budgeting & Cost Management
Risk Management
Resources Allocation
Economics Estimation Calculator
Empirical Estimation
Heuristic Estimation
Analytical Mathematical Models
Select a category to see calculation methods
Rechercher


Vite + React + TS
localhost:5173
Logout
Economics Estimation
Budgeting & Cost Management
Risk Management
Resources Allocation
Risk Management
Risk Management
Decision Tree
Sensitivity Analysis
Monte Carlo
Monte Carlo Simulation
Nombre de tirages (trials)
1000
Valeur minimale (min)
8000
Valeur maximale (max)
12000
Calculer Monte Carlo
Résultats Monte Carlo :
Moyenne : 10078.33
Écart-type : 1147.67
Min observé : 8001.30
Max observé : 11998.80
Distribution des résultats Monte Carlo
Nombre de tirages
32°C
Ensoleillé
Rechercher
12:19
12/06/2025


Vite + React + TS
localhost:5173
50 %
Réinitialiser
Economics Estimation
Budgeting & Cost Management
Risk Management
Resources Allocation
Risk Management
Risk Management
Decision Tree
Sensitivity Analysis
Monte Carlo
Sensitivity Analysis
Base Value
10000
Variations (en %)
-20.0%
-0.2
-10.0%
-0.1
0.0%
0
10.0%
0.1
20.0%
0.2
Calculer Sensitivity
Résultats Sensitivity :
Development Cost (-20%) : 8000
Development Cost (-10%) : 9000
Development Cost (0%) : 10000
Development Cost (+10%) : 11000
Development Cost (+20%) : 12000
Résultats Sensitivity Analysis
Valeur Sensitivity
32°C
Ensoleillé
Rechercher
12:19
12/06/2025


Vite + React + TS
localhost:5173
Logout
Economics Estimation
Budgeting & Cost Management
Risk Management
Resources Allocation
Economics Estimation Calculator
Empirical Estimation
Heuristic Estimation
Analytical Mathematical Models
Empirical Estimation Methods
Select a method:
COCOMO
COCOMO Estimation
kloc
50
cost_per_pm
12000
mode
organic
RELY
1,1
DATA
1,08
CPLX
1,17
TIME
1,11
STOR
1,2
Calculate


Vite + React + TS
localhost:5173
Logout
Economics Estimation
Budgeting & Cost Management
Risk Management
Resources Allocation
Resources Allocation
Scenario #1
chinese
Duration (days)
02
Effort (hours/day)
3
+ Add Task
Scenario #2
french
Duration (days)
5
Effort (hours/day)
18
+ Add Task
+ Add Scenario
Analyze Scenarios