### Case Study: Software Development Project for an E-Commerce Platform

#### 1. \*\*Types of Risks Identified:\*\*

The project involves developing a new e-commerce platform with multiple features, including user registration, product search, checkout, and payment integration. The identified risks are as follows:

1. \*\*Technical Risks:\*\*

- Integration failure with third-party payment gateways.

- Performance issues due to high user traffic.

- Data security vulnerabilities.

2. \*\*Financial Risks:\*\*

- Budget overruns due to unforeseen technical challenges.

- Cost increase for additional resources (hardware, software licenses).

- Unexpected expenses in outsourcing for specialized tasks.

3. \*\*Scheduling Risks:\*\*

- Delays in project milestones due to resource unavailability.

- Requirement changes leading to scope creep.

- Delay in third-party API integration (e.g., payment gateway or shipment tracking).

4. \*\*Resource Risks:\*\*

- Key personnel leaving the project (developer, project manager).

- Shortage of skilled developers for specific tasks.

- Dependency on third-party contractors.

#### 2. \*\*Steps Involved in Risk Management:\*\*

1. \*\*Risk Identification:\*\*

- Brainstorming with the project team and stakeholders.

- Reviewing historical data and lessons learned from similar projects.

- Creating a Risk Register to document each identified risk.

2. \*\*Risk Assessment:\*\*

- Determine the probability (low, medium, high) and impact (low, medium, high) of each risk.

- Classify risks based on severity (e.g., critical, high, medium, low).

- Use tools like Risk Matrix to prioritize risks.

3. \*\*Risk Mitigation:\*\*

- Develop response strategies for each risk:

- Avoidance: Change project plan to eliminate the risk.

- Mitigation: Reduce the likelihood or impact of the risk.

- Transfer: Shift the risk to a third party (e.g., insurance).

- Acceptance: Acknowledge the risk and prepare for it.

4. \*\*Risk Monitoring:\*\*

- Regularly review and update the risk register.

- Track risk indicators and review mitigation plans.

- Conduct periodic risk audits to identify any new risks or changes to existing risks.

#### 3. \*\*Decision Tree Based on the Identified Risks:\*\*

Let's create a simplified decision tree for three major risks:

1. \*\*Risk 1: Integration Failure with Payment Gateway\*\*

- Probability: 30%

- Impact: Additional 2 months delay; Cost: $15,000

2. \*\*Risk 2: Delay in Project Milestones Due to Resource Unavailability\*\*

- Probability: 40%

- Impact: Additional 1 month delay; Cost: $10,000

3. \*\*Risk 3: Scope Creep Due to Requirement Changes\*\*

- Probability: 20%

- Impact: Additional 3 months delay; Cost: $25,000

The decision tree branches represent possible outcomes of risk events occurring or not occurring, along with their associated costs.

#### 4. \*\*Quantifying Impact of Each Path of the Decision Tree:\*\*

For each path, we calculate the total cost and delay:

- \*\*Path 1: No Risk Occurs\*\*

- Total Cost: $0

- Total Delay: 0 months

- \*\*Path 2: Only Risk 1 Occurs\*\*

- Total Cost: $15,000

- Total Delay: 2 months

- \*\*Path 3: Only Risk 2 Occurs\*\*

- Total Cost: $10,000

- Total Delay: 1 month

- \*\*Path 4: Only Risk 3 Occurs\*\*

- Total Cost: $25,000

- Total Delay: 3 months

- \*\*Path 5: Risk 1 and Risk 2 Occur\*\*

- Total Cost: $25,000

- Total Delay: 3 months

- \*\*Path 6: Risk 1 and Risk 3 Occur\*\*

- Total Cost: $40,000

- Total Delay: 5 months

- \*\*Path 7: Risk 2 and Risk 3 Occur\*\*

- Total Cost: $35,000

- Total Delay: 4 months

- \*\*Path 8: All Risks Occur\*\*

- Total Cost: $50,000

- Total Delay: 6 months

#### 5. \*\*Expected Monetary Value (EMV) Calculation:\*\*

EMV is calculated as the sum of each risk’s probability multiplied by its impact (cost).

- \*\*Risk 1 EMV\*\* = Probability × Impact = 0.30 × $15,000 = $4,500

- \*\*Risk 2 EMV\*\* = 0.40 × $10,000 = $4,000

- \*\*Risk 3 EMV\*\* = 0.20 × $25,000 = $5,000

Total EMV = $4,500 + $4,000 + $5,000 = \*\*$13,500\*\*

#### 6. \*\*Total Expected Cost:\*\*

- Base project cost (assume): $100,000

- Total Expected Cost = Base Cost + EMV

- Total Expected Cost = $100,000 + $13,500 = \*\*$113,500\*\*

#### 7. \*\*Cash Flow Forecasting for the Next 5 Years:\*\*

Based on the expected project cost and considering the project's potential revenue or savings over 5 years, we estimate the following cash flows:

| Year | Cash Inflow | Cash Outflow | Net Cash Flow |

|------|-------------|--------------|---------------|

| 1 | $50,000 | $113,500 | -$63,500 |

| 2 | $120,000 | $20,000 | $100,000 |

| 3 | $150,000 | $20,000 | $130,000 |

| 4 | $200,000 | $25,000 | $175,000 |

| 5 | $250,000 | $30,000 | $220,000 |

#### 8. \*\*Net Present Value (NPV) Calculation:\*\*

We calculate NPV using a discount rate (e.g., 10%) to account for the time value of money. NPV is given by:

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\text{NPV} = \sum\_{t=1}^{n} \frac{\text{Net Cash Flow}\_t}{(1 + r)^t}

\]

Where:

- \( t \) = year (1 to 5)

- \( r \) = discount rate (e.g., 10% or 0.10)

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\text{NPV} = \frac{-63,500}{(1 + 0.10)^1} + \frac{100,000}{(1 + 0.10)^2} + \frac{130,000}{(1 + 0.10)^3} + \frac{175,000}{(1 + 0.10)^4} + \frac{220,000}{(1 + 0.10)^5}

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### Conclusion:

The risk analysis and financial forecasting provide insights into the potential cost and profitability of the project. By identifying and quantifying risks, we can make informed decisions to mitigate negative impacts and maximize project value. The detailed NPV calculation shows whether the project will generate a positive return on investment considering the impacts of the identified risks.