**Project Risk Management, PMBOK 6th Edition**

Michael D. Harper, Ph.D.

 *“Project risk management is concerned with identifying, analyzing, and responding to project risk.”*

|  |  |  |
| --- | --- | --- |
|  | **Project Risk Management** | **Process Groups** |
|  | **Major Processes** | Initiating | Planning | Executing | Monitoring &Controlling | Closing |
| 🡪 | Plan Risk Management |  | 1 |  |  |  |
| **🡪** | Identify Risks |  | 2 |  |  |  |
| **🡪** | Perform Qualitative Risk Analysis |  | 3 |  |  |  |
| **🡪** | Perform Quantitative Risk Analysis |  | 4 |  |  |  |
| 🡪 | Plan Risk Responses |  | 5 |  |  |  |
|  | Implement Risk Responses |  |  | 6 |  |  |
| 🡪 | Monitor Risks |  |  |  | 7 |  |

|  |  |
| --- | --- |
| **Risk & Utility** | Risk= [Probability & Outcome] or [Likelihood & Consequence] |
| Utility= Attitude toward risk. (Risk-neutral, Risk-averse, Risk-prone) |

|  |  |
| --- | --- |
| **Plan Risk Management** | Risk Management Plan (RBS, Approach, Components) |
| RBS: Risk Breakdown Structure (Identify Risk Categories) |

|  |  |
| --- | --- |
| **Identify Risks** | Create a Risk Register of risk events. |

|  |  |
| --- | --- |
| **Risk Analysis** | Perform Qualitative Risk Analysis. 🡪 Risk Ranking. (Matrix, Risk Factor, Top Ten Tracking, Watch List.) |
| Perform Quantitative Risk Analysis. 🡪 Risk Evaluation. (Stochastic Utility Analysis, Decision Analysis, PERT/CPM Analysis, Simulation.) |

|  |  |
| --- | --- |
| **Plan Risk Responses** | Risks with Positive and Negative Consequences. |
| Additional Risks and Plans. |

|  |  |
| --- | --- |
| **Monitor Risks** | Conduct risk audits and reviews |
| Analyze triggers, trends, patterns. |

**Risk & Utility**

**Risk= [Probability & Outcome] or [Likelihood & Consequence]**

|  |  |  |
| --- | --- | --- |
| **Levels of Risk** | low consequence | high consequence |
| high probability | moderate risk | high risk |
| low probability | low risk | moderate risk |

**Utility= Attitude toward risk. (Risk-neutral, Risk-averse, Risk-prone)**

|  |  |  |
| --- | --- | --- |
| Risk Prone |  | Stakeholders |
| Risk Neutral | 🡨can apply to🡪 | Project Team |
| Risk Averse |  | Organization |

|  |
| --- |
| **Terminology** |
| **Measured Risk** | **vs** | **Perceived Risk** |
| ***Risks*** | ***vs*** | ***Barriers*** |
| ***Risk Management*** | ***vs*** | ***Crisis Management*** |

***Consider the ‘Reference Lottery’***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  (0.5) | Win | $1 |  |
|  | Risky Decision 🡪 | GO | ($0) |  |  |  |  |
|  |  |  |  |  (0.5) | Lose | –$1 |  |
|  | Certain Decision 🡪 | NOGO |  |  |  | $0 |  |
|  |  |  |  |  |  |  |  |
|  |  ↑ |  ↑ ↑ |  ↑ |
|  |  Decision Node | Chance Probability Outcome Node |
|  |  |  |  |  |  |  |  |

***Keys to Project Risk Management***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Planning** |  | **Responding** |  | **Closure** |  |
|  | \*Balance\*Project Importance |  | \*Cost-Benefit\*Be results driven\*Stakeholders |  | \*Communications\*Lessons Learned |  |
|  |  |  |  |  |  |  |

**Plan Risk Management**.

**Risk Management Plan (RBS, Approach, Components)**

**RBS: Risk Breakdown Structure (Identify Risk Categories)**

|  |
| --- |
| ***Organize Sources of Risk*** |
| Project* Scope
* Time
* Cost
* Quality
 | Phases* Phase I
* Phase II
* Phase III
 | Business* Market
* Financial
* Technology
* People
 | Applications* Event
* Construction
* IT
* SCM
 |

**Identify Risks**. Create a Risk Register of risk events.

|  |
| --- |
| ***Risk Register*** |
| ***Category–WBS*** | ***Risk Name***1 | ***Description***2 | ***Source***3 | ***Level***4 | ***Comments***5 |
| ***1.1***  |  |  |  |  |  |
| ***1.2***  |  |  |  |  |  |
| ***2.1***  |  |  |  |  |  |
| ***2.2***  |  |  |  |  |  |
| ***- - -*** |  |  |  |  |  |
| 1**Risk Name**. Name of risk, ID, etc.2**Description**. The event, series of events, consequences, impact, etc.3**Source**. Internal, External, Business, Project, etc.4**Level**. High, Medium, Low5**Comments**. Triggers, trends, patterns, possible responses, possible secondary or residual risks, etc. |

**Risk Analysis**.

|  |
| --- |
| **Perform Qualitative Risk Analysis**. 🡪 Risk Ranking. (Matrix, Risk Factor, Top Ten Tracking, Watch List.) |
| **Perform Quantitative Risk Analysis**. 🡪 Risk Evaluation. (Stochastic Utility Analysis, Decision Analysis, PERT/CPM Analysis, Simulation.) |

Failure Mode Effect Analysis (FMEA)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Risk | S | L | D | RPN |  | Definitions |
| #1 | 8 | 5 | 6 | 240 |  | S=Severity |
| #2 | 7 | 6 | 5 | 210 |  | L=Likelihood |
| #3 | 5 | 3 | 8 | 120 |  | D=Detectability |
| --- | --- | --- | --- | --- |  | RPN=Risk Priority Number=S\*L\*D |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  | **Probability and Impact Matrix** |  |
|  | Likelihood | Probability | Threat | Opportunity |  |
|  | Very High | 0.9 | 0.09 | 0.27 | 0.45 | 0.63 | 0.81 | 0.81 | 0.63 | 0.45 | 0.27 | 0.09 |  |
|  | High | 0.7 | 0.07 | 0.21 | 0.35 | 0.49 | 0.63 | 0.63 | 0.49 | 0.35 | 0.21 | 0.07 |  |
|  | Moderate | 0.5 | 0.05 | 0.15 | 0.25 | 0.35 | 0.45 | 0.45 | 0.35 | 0.25 | 0.15 | 0.05 |  |
|  | Low | 0.3 | 0.03 | 0.09 | 0.15 | 0.21 | 0.27 | 0.27 | 0.21 | 0.15 | 0.09 | 0.03 |  |
|  | Very Low | 0.1 | 0.01 | 0.03 | 0.05 | 0.07 | 0.09 | 0.09 | 0.07 | 0.05 | 0.03 | 0.01 |  |
|  |  | Probability | 0.1 | 0.3 | 0.5 | 0.7 | 0.9 | 0.9 | 0.7 | 0.5 | 0.3 | 0.1 |  |
|  |  | Impact | VeryLow | Low | Moderate | High | VeryHigh | VeryLow | Low | Moderate | High | VeryHigh |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |
| --- |
| **Decision Tree** |
|  |  |  |  |  |  |  |  |
|  |  |  |  | Strong | 0.6 | +$200M |  |
|  |  | Build | $36M |  |  |  |  |
|  |  | Cost=$120M | [ 36=(0.6\*200+0.4\*90) – 120] | Weak | 0.4 | +$90M |  |
|  | Decision |  |  |  |  |  |  |
|  |  |  |  | Strong | 0.6 | +$120M |  |
|  |  | Upgrade | $46M |  |  |  |  |
|  |  | Cost=$50M | [ 46=(0.6\*120+0.4\*60) – 50] | Weak | 0.4 | +$60M |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

|  |
| --- |
| **Decision Table** |
|  |  |  |  |  |  |  |
|  |  |  | Demand |  |  |
|  | Decision | Cost | Strong | Weak | EMV |  |
|  | Build | $120M | $200M | $90M | $36M |  |
|  | Upgrade | $50M | $120M | $60M | $46M |  |
|  |  |  | 0.6 | 0.4 |  |  |
|  |  |  |  |  |  |  |

**Plan Risk Responses**.

|  |
| --- |
| **Risks with Negative Consequences.**Avoidance – Eliminate risk.Acceptance – Do nothing.Transference – Sharing consequence or outcome.Mitigation – Reducing likelihood impact of outcome. |

|  |
| --- |
| **Risks with Positive Consequences.**Exploitation – Ensuring the realization of an opportunity.Enhancement – Modifying probability, consequence, drivers, or triggers to increase likelihood of opportunity.Sharing – Sharing consequence or outcome for mutual benefit. |

|  |
| --- |
| **Additional Risks.**Residual Risks – Risks remaining after response measures.Secondary Risks – Additional risks introduced by response measures. |

|  |
| --- |
| **Additional Plans.**Contingency Plans – Planned responses to risk occurrences.Fallback Plans – Planned responses to failed primary responses. |

|  |
| --- |
| **Contingency Planning**. High risk potential events or predictable surprises. ADPEU: Anticipate 🡪 Design 🡪 Prepare 🡪 (Event) 🡪 Execute 🡪 UpdateIdentification. Failures due to: Scanning, Information, Incentive, LearningScanning – Lack of ability to access the informationInformation – Lack of ability to understand the informationIncentive – Lack of ability to recognize the importance of the informationLearning – Lack of ability to communicate the informationContingent Resources. Flexibility Principle.Flexible supply contracts. – Requires understanding impact of source characteristicsMultisourcing. – Requires understanding locations of needed redundancyReserve shipping capacity. – Requires efficient utilization and communicationTemporary workers. – Requires prior planning of needs and procedures |

**Monitor Risks**.

|  |
| --- |
| **Conduct risk audits**Examine effectiveness of procedures. |

|  |
| --- |
| **Conduct risk reviews**Evaluate current risks or identify new risks.  |

|  |
| --- |
| **Analyze triggers, trends, patterns**. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Crisis Management**. Triggers, Trends, Patterns.

|  |  |
| --- | --- |
| **Contingency Planning** | **Crisis Management** |
| Proactive | Reactive |
| Planning | Process |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
|  |  |  | Awareness |  |  |  |
|  |  |  |  |  |  |  |
|  | Flexibility |  | OrganizationalPreparedness |  | Empowerment |  |
|  |  |  |  |  |  |  |
|  |  |  | Communication |  |  |  |
|  |  |  |  |  |  |  |

 |