AACE INTERNATIONAL RECOMMENDED PRACTICE

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CHOOSING AMONG STRATEGIC ALTERNATIVES USING BRANCHING CONCEPTS IN DECISION MODELING

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TCM Framework: 3.2 – Asset Planning
3.3 – Investment Decision Making
7.5 – Risk Management

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1. INTRODUCTION

The purpose of this recommended practice (RP) is to describe risk analysis concepts that can be used when important alternative selection strategies are being developed by senior leaders. These selections are made well before there is a detailed project plan, schedule, and cost estimate. The RP describes the development of simplified models to assess alternatives under consideration. These models highlight key systemic and project-specific risk characteristics. They provide clarity, transparency, traceability, and repeatability consistent with recommended project risk analysis practices. Models are presented here to illustrate two of these methods, probabilistic branching and conditional branching.

During the "Select" phase[1] for any significant project, strategic alternatives are being evaluated, and one of the main considerations will include the balance of risk driving any alternative. This recommended practice (RP) addresses decision modeling using quantified risk analysis methods to conduct an analysis of alternatives (AoA). The model is simplified to highlight the key risks and feasible alternative configurations, to select the best alternative.

This RP document is not intended to be a standard. Rather it is intended to provide a guideline for using project risk analysis simulation capabilities of probabilistic and conditional branching to evaluate alternative selection within a simplified model framework of the project's strategy. RPs are considered by most practitioners to be good processes that can be relied on and that they would recommend be considered for use where applicable. The RP will be useful to organizational leaders and decision-makers, project management, and risk team leaders.

2. RECOMMENDED PRACTICE

It is recommended that organizations facing with strategic decisions follow structured decision analysis (DA) frameworks and practices. The process steps of (1) Structuring, (2) Evaluation, (3) Agreement, and (4) Implementation are discussed in the *TCM Framework*. [1, pp. 79-80, Section 3.3.1.1] This RP directly supports steps (1) and (2) and contributes to steps (3) and (4).

For demonstrative purposes, this RP will evaluate a hypothetical example of a Class 4/Select gate decision. An organization faces a strategic capital expansion decision: A large, complex plant for producing an important product must be built to maximize their market share. Two camps of executives are debating the new plant's configuration. Some see this as an opportune time to lead the industry by inserting a new technology. Other leaders believe that the new technology may be difficult to master, and that there is a strong risk that they cannot make it ready for this project in time to capture market share as required. They insist on at least having an alternative Plan B available to switch to the existing technology if the new technology becomes difficult and takes a long time to master.

Executives representing both points of view share a sense of urgency. They understand that their prime competitor is also building a production plant. If this team's project fails by being late to launch, the competitor can gain a significant advantage by being first to market with the product. They also agree that the risk associated with deploying the new technology should be a significant factor in their making this strategic decision.

This RP recommends using risk analysis concepts in decision-making between the two described alternatives.

[1] See Class 4, TCM 3.2 Asset Planning; 4.1 Project Implementation. [1]

2.1. Using Risk Analysis Techniques to Examine Risk-Based Strategy Decisions

This RP examines applying branching concepts and techniques to the risk component of a strategic decision early in the process of structuring a project (see TCM 3.2 and 4.1). These strategic decisions will likely be more impactful for the project than risks that may occur during the execution phase.

This approach introduces risk analysis earlier in the decision-making process and higher up the management ladder than is usual. At this point in project development, neither a detailed plan nor a cost estimate exists that can be examined for contingency calculations and risk mitigation. Decisions about fundamental project aspects are yet to be made. It is proposed to model the decision that has a strong component of risk to success as soon as the risk impact of alternative choices can be discussed. An important consequence of strategic risks is the amount of time it takes to resolve them satisfactorily. The decision models presented in various figures of this RP demonstrate the application of probabilistic and conditional branching in strategic alternative analyses; these figures do not represent the project schedule. In this process, teams develop a time-phased network risk modeling that includes logically driving interfaces, uncertainties, and risks.

People involved in the organization's business leadership/asset ownership positions and strategic decision-making for this analysis are different from the typical project management team that carries out the execution. They are in the organization's leadership and subject matter expert positions with decision making responsibility. They decide on a project strategy that will guide key decisions to be made later and may be turned into an executable detailed plan with a cost estimate.

The distinction between where risk analyses usually occur (B) and the focus of this RP (A) is shown in Figure 1 which expands the application of this RP to a Class 5 gate, where multiple scope options are still available.

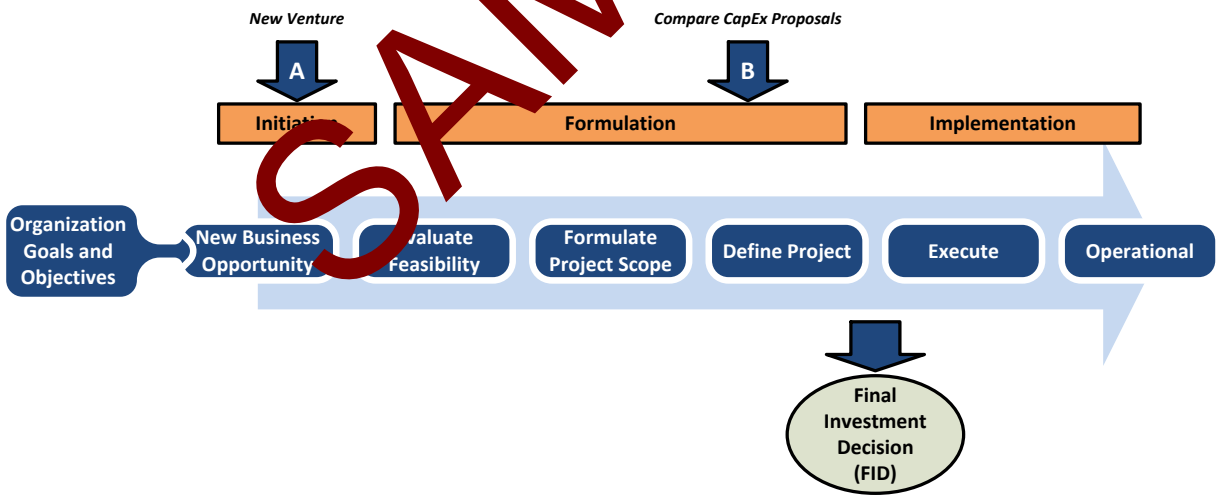

Figure 1: Progress of a Project Decision with Risk Analysis at Initiation and Formulation

At initiation and during formulation stages, important strategy, scoping, project, and life-cycle cost decisions will be made. While risk is the focus of this RP, there are many other aspects to consider when choosing a strategic alternative. The benefits of reviewing technical readiness risk upstream of the project's final investment decision include:

- Highlights risk aspects of decisions. Risk to a potential project is important but it may not be controlling for the leadership. While there is a risk component in early decision-making, care should be taken when risk is discussed without applying available methods of quantitative analysis. Applying quantitative methodologies early in the project life cycle provides an advantage over the traditional application of Monte Carlo simulation (MCS) or other macro level based methods in the final investment decision (FID) or later.
- Supports leadership decisions. Risks are examined according to professionally recommended practices. These methods are transparent, reproducible, and show results that are directly connected to the risks consistent with the general principles presented in AACE RP 40R-08. [2]
- Encourages participation of senior leadership. By engaging senior leadership in the risk assessment, they will then fully understand the implications of risk and subsequently own the risk of the alternatives. The risk model should be validated and assessed based on their understanding of typical risk parameters: probability of occurring, impacts on activity durations and costs if they were to occur, and mapping into the risk model's structure. This awareness may also lead to responses that change the pre-mitigated condition and, therefore, the consequences of residual risk. Decisions will benefit from a clear analysis of the shape of the risk and its consequences. Early attention to risk management by senior leadership will provide continuity of a risk-focused strategy through project execution.

The risk models shown in this RP eliminate much detail typically found in later project stages to highlight critical risk aspects. While this RP focuses on one hypothetical technological readiness risk, there may be several key risks, and each can be modeled. Then, a consolidated risk model may be made to illustrate their interrelated consequences to the project. For research relevant to this RP, see the US Government Accountability Office (GAO) *Technology Readiness Assessment Guide.* [3]

3. TWO APPROACHES TO ANALYZE STRATEGIC ALTERNATIVES

This RP presents two commonly used risk-based methodologies, probabilistic branching, and conditional branching, that can be used in simplified models to highlight the risk aspect of a strategic decision. These methodologies may be known but may not have traditionally been applied in analyzing strategic early decisions.

Probabilistic branching examines the likelihood that a technology will not pass a key test.

- While passing the test is represented in the model, test failure is a possibility.
- Failure is represented by a simple probability of occurrence, with subsequent activities to:
  - Understand the causes of failure,
  - Plan to fix the technology,
  - Implement the plan, and
  - Re-test the technology.
- The resulting finish date with a desired level of confidence can be estimated with probabilistic branching.

Conditional branching enables risk models to adapt, as would the behavior of the project manager.

- In a baseline plan, Plan A, management establishes the *trigger date* on which the new technology must be adopted or rejected in favor of switching to Plan B.
- The backup plan, Plan B in this example, is an existing, less risky but adequate technology.
- Both alternative plans, A and B, are programmed in the model.
- The activity, Initial Exploration of the New Technology, has a higher degree of risk which depends on its readiness.
- In each iteration of the simulation model, the new technology may or may not achieve timely readiness.
- The model chooses Plan A or Plan B depending on whether the initial assessment of the new technology is completed favorably and in a timely fashion.