

# Chapter XV

## Analysis of Individual Risk Attitude for Risk Management Based on Cumulative Prospect Theory

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### ABSTRACT

*In this chapter, we used Cumulative Prospect Theory to propose an individual risk management process (IRM) including a risk analysis stage and a risk response stage. According to an individual's preferential structure, an individual's risk level for the confronted risk can be identified from risk analysis. And based on a response evaluation model, the appropriate response strategy is assessed at the risk response stage. The applicability of the proposed model is evaluated by an A-C court case. The results have shown that the proposed method is able to provide more useful and pertinent information than the traditional method of decision tree by using the expected monetary value (EMV).*

### INTRODUCTION

Risk management has been widely applied in various fields, such as economics, insurance, industry, and so on. While the word “risk” means that uncertainty may be expressed through probability, risk management is a process comprising two main segments: risk analysis and risk response.

Most studies on risk management have focused on the causes and effects of a risk event. While this is important, follow-up considerations for assessing risks and response can provide valuable information in the face of risks. In addition, different individuals take the same risk event with different degrees of impacts. In consequence, the adopted actions will be different from dif-

ferent types of individuals. The studies from individual's viewpoint were rarely found in the literature, yet it is significant, in particular, if an effective strategy is going to be proposed. Thus, in this chapter we intend to base on individual's preference to propose an Individual Risk Management process call IRM in brief, which includes two parts of risk analysis and risk response. The risk analysis procedure is to identify the degree of risk with respect to the individual's tolerance level; and the risk response process is to assess the considered response strategy, in order to provide an appropriate action.

Piney (2003) has introduced an idea of linking risk management and cognitive psychology to identify four personal risk zones with respect to the gains and losses of the outcomes. In light of the magnitude of influence, these four zones are the dead zone, the rational zone, the sensitivity zone, and the saturation zone. Since Piney's paper did not provide a measure to classify these zones, in this chapter, we shall first investigate such issue to define an appropriate measure and then propose a systematic approach to analyze the risk magnitude, based on an individual's tolerance level.

## **BASIC CONCEPTS**

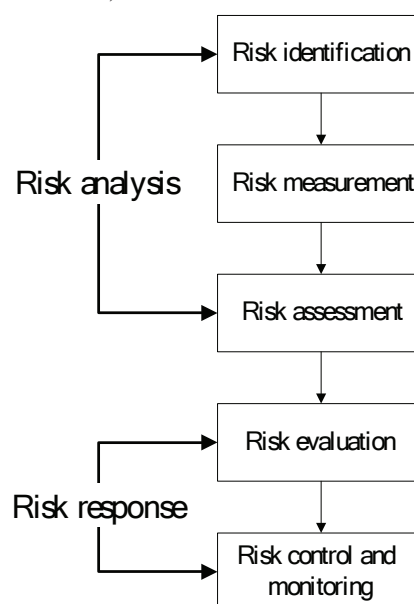
Much research has been done on risk management (e.g., Tummala & Leung, 1996; Tummala & Burchett, 1999). The risk management process (RMP) provides a systematic structure to assess the consequences and the likelihood of occurrence associated with a given risk event. Risk analysis and risk response are two major parts of RMP. At the risk analysis stage, we begin by identifying the risk management mission, aims, and objectives, followed by the identification of potential risk factors, enumeration of the associated consequences and their severity, and the assessment of the likelihood of these consequences occurrence. At the risk response stage, the managers should

be able to evaluate several risk response strategies, based on risk profiles generated by the risk analysis phases, choosing the most appropriate course of action to avoid or control the identified risks. This may be accomplished in four useful categories of response strategy of: risk acceptance, risk mitigation, risk transfer, and risk avoidance (Piney, 2003). Finally, by applying the risk control and monitoring steps, the risk management process is reviewed and the suitable response actions are implemented. The entire process is outlined in Figure 1.

Although risk management procedures have been developed extensively, the considered factors are not comprehensive. Most of the existing studies have focused on objective evaluation and ignored subjective factors which, however, can help us to discriminate the different impacts of risk events for different individuals and thus allow the adopted actions to be more effective. Based on this idea, we introduce the individual's subjective values into the process of risk management.

Personal judgments about uncertainty and values are important inputs for making any decisions.

*Figure 1. Risk management process (Tummala & Burchett, 1999)*



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