Risk Modeling, Assessment, and Management, by Yacov Y. Haimes. New York: John Wiley & Sons, Inc., 1998, ISBN 0-471-24005-2, xviii+726pp., $105.00.

Risk Analysis is becoming a sine qua non consideration for any large scale project or multibillion dollars decisions. Considering how unpredictable of the external forces that will influence the success or failure of a project, and the severity of the consequence that will bring when the unpredictable occurs. One of the primary purpose of conducting risk analysis is an attempt to bring these unbearable unknown to a bearable understanding of the consequence and prepare for any remedial action that required when the unpredictable actually happens, or even better, make decisions and take actions to avert the perceived risks . This book is an attempt to address and provide some solutions to the above mentioned conundrums.

Mr. Haimes strongly emphasizes a holistic approach to risk analysis. This means the identification, quantification, evaluation, and trading-off of risks, benefits and costs should constitute an integral and explicit component of the overall managerial decision-making process. Without this holistic approach, an optimization problem can become a meaningless exercise, and even worse, a narrowly focused risk analysis which misses the big picture can lead to a decision with a disastrous consequence.

This book goes beyond the classical single decision maker, single objective function, using the expected loss as the valuation criteria model to a more realistic model of multiple constituencies, thus, multiple decision makers and multiple objective functions with the extreme rare event and catastrophic loss as one of the incommensurate object function to evaluate.

The concept of Pareto optimal is introduced to prepare for answering the question of "How do you address the optimization problem in a multiple objective functions ? " . In simple terms, a Pareto optimum solutions to a multi-objective problem is a subset in a decision space within which with any decisions that improve one or more of objective functions will incur loss in one or more other objective functions. In another word, for any decision, if you can find an improvement on all objective functions then the decision is not a Preto optimal solution. How to select an optimal solution in a Pareto optimum solution set is largely answered in Chapter 5 Multi-objective Trade-off Analysis using surrogate worth trade-off method.

In despite of the mathematical formulation of the objective functions and the trade-off functions, certain evaluation of the trade-off are depending on the subjective judgments and opinions. And this again is no better than the classical approach of constructing a personal utility function (defining a personal tolerance to the risk) using indifference band. As an example, in phase II of software risk management (page 614), it requires the contractor to estimate lowest and highest costs (the range), the author states that there are several possible explanations for a close range estimate, that is the contractor is a) a risk seeker, b) very knowledgeable, c) very ignorant. And the question is which one should you pick or believe?

A major advance in risk analysis and decision analysis must come from the risk attitude and tolerance assessment. This is the most blurring area in the risk analysis and it may be required a better solution from other discipline of science (field of psychology may be provide some help ?). Thus why the questions posed by William W. Lowrance: "Who should decide on the acceptability of what risk, for whom, in what terms, and why?" [Lowrance, 1976] is so important and relevant.

This book provides a very good system engineering's perspectives in risk analysis. The readers can also find the following subjects in the book : System Engineering and Seven Habits of Highly Effective People, Hierarchical Holographic Modeling (HHM), Risk of Extreme Events and the Fallacy of the Expected Value, Multiple and conflict objectives, The Partitioned Multi-objective Risk Methods (PMRM), Risk and Uncertainty, Defining Uncertainty and Sensitivity Analysis, Statistics of Extreme and more.

The examples provided in the book are heavily in civil engineering projects and problems. It will be more interesting if the author can provide the application in financial investment and portfolio management. It is a fertile ground to apply the risk analysis in the portfolio management especially in the light of last year's hedge fund debacle. The situation may be avoid with a understanding of the fallacy of the expected value

and applying “low probability with a catastrophe loss” as one of the incommensurate objective function in their equations

Several improvements can be made on this book which include numerous typo needed to be cleaned up (e.g. (9.15) in page 365, superscript errors in A7.2 page 699 etc…), chapter in HHM needs a more pragmatic treatment, uneven mathematical handling (advanced calculus and differential equations required to understand some passages).

In despite of above mentioned problems, this is a very good book for people who are interested at applying the risk analysis in a real world problem. For the researchers, this book brings forth numerous interesting further research topics. And for the financial analyst, this book can bring in a very useful tools and concepts in the portfolio management. And of course, for all engineers and program managers, this book is a must read in your library.

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References:

Lowrance, W.W., 1976, Of Acceptable Risk, William Kaufmann, Los Altos, CA.