

Preface

Decision making in the dynamic and rapidly evolving world is a major challenge. Decision making essentially involves the generation of a set of alternatives and the choice of the most appropriate alternative for execution by answering the following important questions: what decisions must be made, who will make them, how and what resources will be allocated, and how will the situation will be measured and revisited in the dynamic environment in which the system will be operating. Also, in large organizations such as a multinational business group or a modern nation state, it is imperative to decide what principles, style and guidelines for decision-making are appropriate for the organization. It is essential to decide what structure will govern the process of decision making.

Structured methods utilizing the theoretical and practical advances made in the fields of mathematics, operations research, cybernetics, artificial intelligence, etc, have become an important aid to decision making in all sectors. The theoretical underpinnings of such decision aids is the principle of optimization, which tries to maximize or minimize certain combinations of conflicting variables representing the matrix of interest for the decision maker under constraints imposed by the real life situation. The empirical, common sense or subjective decision making of the past graduated to the field of operations research based on the principle of optimization and has resulted in enhanced decision aids at all levels of an organization.

When the rules of the game are well laid out, when the environment in which one operates is predictable, when the opponents are known, when the actors behave in a deterministic manner, when variables vary within a small and narrow band, and, when linear relations are the norm, one can try to make decisions using the standard optimization techniques. However, when the benefits of actions are unpredictable, when relationships between variables may not only be non-linear and stochastic, but actually unknown, the principle of optimization for decision making will not help much. This is exactly the world that we are facing today. Strategic, operational and tactical agility in quickly responding with maximum concentration of effort is the absolute requirement. At the tactical and operational level standard optimization techniques for decision making have helped to some extent. However, at the strategic levels these techniques have not been able to make a greater impact.

The problems in which stakes are extremely high, human perceptions and judgments are involved and whose solutions have long term repercussions, fall in the strategic level decision-making category. At this level problems are ill defined and are usually in terms that are uncertain, fuzzy and confusing. However, the existing problem-solving techniques based on sound mathematical principles require systematic and well-formed problems. This mismatch between problems and their solution techniques leads to frustration and a lack of confidence by the top decision

makers. To solve such problems with limited amounts of time and resources needs the balancing of many variables. This book focuses on applying the Analytic Hierarchy Process (AHP) for such strategic level decision-making problems.

The Analytic Hierarchy Process (AHP) is a systematic approach developed in late 1970s to structure the experience, intuition, and heuristics-based decision making into a well-defined methodology on the basis of sound mathematical principles. The AHP is suited to quantitatively arrive at the decision in the strategic domain. It provides a formalized approach for creating solutions to decision-making problems, where the economic justification of time invested in the decision-making process is reflected in the better quality solutions of the complex decision-making problems.

Strategic level decision making in the three main endeavors of human existence, i.e., Business, Defense and Governance has been described in this book. The book covers a variety of problems in the three domains – from vendor selection to weapon system evaluation, from software projects management to disaster management, from factors affecting national security to factors affecting technology proliferation. Practical case studies from the authors' experiences of many years in applying the AHP in these three domains have been comprehensively dealt with. The range of problems covered in the above three domains of the book gives a comprehensive exposure to the reader to the extent of assistance that a formal methodology such as the Analytic Hierarchy Process (AHP) can provide to a decision maker in evolving strategic decisions in such complex and varied domains in a highly dynamic, uncertain, unknown, and unpredictable world.

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