MANAGEMENT SCIENCE: A PARADIGM FOR SUCCESSFUL LIVING

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ABSTRACT

Most of the models taught in management science courses rely on philosophical underpinnings that translate into lessons for dealing with life's many problems. The authors suggest ways of adapting these concepts into strategies for successful life management. The focus is not on the mechanics of the models, but rather on the conceptual basis that underlies the mathematics – the WHY that provides the rationale for the HOW.

INTRODUCTION

Current textbooks in management science and quantitative methods cover not only the mathematical aspects of the various models, but also the philosophical basis for the various techniques. Recent examples include Anderson et al. (2008), Hillier and Hillier (2008), Pinney et al. (2005), and Taylor (2007). In introducing the models, these authors provide the context in which the techniques can be applied, as well as application of the techniques in practical problems. Moreover, they provide practice examples for further understanding of not just the technical solutions to the questions, but a feel for the contextual basis for the models. In this paper, several of the more widely used management science models are referenced, with an emphasis on their philosophical underpinnings, rather than their mathematical attributes.

UNDERLYING CONCEPT

The foundation that provides the basis for quantitative decision making is that there are optimal solutions to life's problems. Some courses of action are better than others; and given a defined objective (or set of objectives) which is delimited by various constraints, there is a best strategy that exploits the constraints and optimizes the objective(s). However, an optimal solution, as is widely known, is not always an attainable solution, nor a practical solution. Consequently, at times, one must implement, or pursue, a course of action which yields a satisfactory solution.

This concept has led to the development of the entire discipline of quantitative analysis for business decisions. Once a decision maker has recognized this truth, s/he cannot be satisfied with sub-optimal strategies when an optimal solution can be realized. The knowledge that optimal decisions exist drives the executive to seek and demand optimal courses of action in not only business decisions, but in personal decisions, as well.

Over/sub-optimization

One measure of a mature decision maker is knowing when to stop the optimization process. *Sub-optimization* describes (1) the selection of a solution that is inferior to the best one, or (2) the adoption of an approach that is optimal from the point of view of a subunit of the organization, but not best from the global or corporate standpoint. *Over-optimization* describes the situation where further analysis costs more than the savings from a nearly optimal strategy, against the truly optimal one. These situations are resolved by cost/benefit analysis, where the added expense of further refinement is compared with the expected improvement from the refined solution.

CONTEXTUAL BASIS OF STRATEGIES FOR LIFE MANAGEMENT

In the following sections, several scenarios that reference widely used management science models are highlighted. Some suggestions of adapting these models into strategies for successful life management are made. The focus is not on the mechanics of the models, but rather on the conceptual basis that underlies the mathematics – the WHY that provides the rationale for the HOW.

Linear Programming

Linear programming requires the identification of an *objective*, which is a function of the controllable variables in the decision at hand. This optimization model seeks to maximize, or minimize, the objective. Essentially, it indicates that a decision is needed of how to measure success in the possible outcomes of the problem situation. So, for example, a person must decide whether down payment or monthly expense is the more important consideration in deciding on the financing plan for a new vehicle (e.g., cash back versus zero percent interest).

Linear programming also requires the specification of certain *constraints* on achieving the optimum value of the objective. For example, the constraints can take the form of budgetary limits, performance minimums, or trade-offs among various features between the available alternatives. Finally, the model demonstrates that there are trade-offs that can be evaluated by tightening or loosening the constraints or varying the contributions of the variables to the objective measure.

Goal Programming

Goal programming expands the linear programming model to permit multiple objectives, while still requiring that the constraints on the decision are met. This decision making model allows for the objectives to be prioritized or weighted and seeks to obtain a satisfactory level of achievement for the multiple objectives. Trade-offs can be evaluated by altering the priority structure (and/or the weights) for the objectives, as well as by adjusting constraints or variables' contributions to the objectives.

Learning Curves

Learning curves acknowledge that experience is a valuable tool in making repeated decisions. The more times a task has to be repeated, the better a person becomes at performing it. For example, in learning to play a musical instrument, or to dribble a basketball, or to ride a bicycle, the more often practice is done, the better the person becomes at doing it. Marriage, however, seems to be an area where this concept does not hold.

Inventory Models

Inventory models illustrate the interplay of the concepts of quantity discounts, obsolescence, holding versus ordering costs, out-of-stock penalties, and the balancing of ownership, as opposed to leasing. Managing inventory is critical to a company's success; the most important aspect of this process involves balancing the trade-offs between the costs of carrying inventory and the benefits of carrying inventory. In the case of grocery shopping, consider how you decide when, and how much, to purchase, say, more milk, orange juice, or coffee.

Breakeven Analysis

The breakeven analysis models focus on the relationship between (1) investment costs and maintenance expenses or (2) costs and revenues. It might be applied to the decision to buy a washer/dryer, rather than paying the laundromat, or to purchase versus lease a car, or to the even larger homeowner versus renter decision.

Dynamic Programming

Dynamic programming is one of the most important philosophical foundations of the aware citizen. Bellman's Principal of Optimality can be paraphrased as: it doesn't matter how we got to the present; the optimal path (policy) to the achievement of the eventual goal is the same. It matters not whether you earned your present situation, were given it as a birthright (good or bad), or were thrown into it by the misdeeds of others. The past cannot be changed; a person can act only in the present, and hope for good outcomes in the future. For example, given an inheritance to be invested, a person needs to decide on the amount to spend today versus future income at different points in time.

Decision Analysis

Understanding the difference between *choices* (i.e., when a person controls the selection among alternatives) and *events* (i.e., where outside forces determine what happens) is a key to making informed decisions. It is the interplay of choices and events that determines *outcomes* (i.e., the results attributed to possible alternatives and uncontrollable forces). Recognizing the distinction and systematically evaluating the impact of decisions leads to rational choices and informed decisions. For example, as a person nears retirement, various decisions must be made with respect to how retirement benefits will be structured.

Queueing

Understanding the basis of queueing (i.e., waiting line) behavior permits a person to deal with the frustrations of phenomena that are encountered daily. For example, phone queues (e.g., please wait for the next available agent) and walk-in health care clinics (e.g., please have a seat in the patients' waiting room) represent a single-queue, multiple-server model; toll plazas and large grocery stores represent a multiple-queue, multiple-server model; and airport security screening represents a multiple-phase, sequential queue model.

SUMMARY

The guiding philosophy suggested herein is that decision models exist to formalize and systematize a person's thinking when making decisions. Selecting an objective (or objectives), specifying the constraints within which the objective(s) can be optimized (or pursuing a satisfactory solution), balancing between short-term and long-term benefits and costs, understanding that how one got to the present is not important in deciding where one should go forward from this point, taking account of uncontrollable factors, and recognizing the structure of systems with which one must interact will enable a person to make life choices that are guided by the concepts underlying the management science tools, even though a person may not be explicitly utilizing the formalized frameworks embodied in the models.

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