SECRETS OF STATISTICAL DATA ANALYSIS AND MANAGEMENT SCIENCE!

By

ANDREI BESEDIN

www.wiseexcel.com

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THE NATURE OF MANAGEMENT SCIENCE

Definition of Management Science

It is difficult to define and bound an area of study which is experiencing a constant Development of new techniques that extend its scope and composition. Management Science is such an area. Despite this difficulty, two prominent features are reflected in the name given to this area of study. "Management," in the context of the methodology, carries with it a strong implication of problem-solving.

Thus, management science is directed at understanding and solving management problems. The second component of the name is "science."

This carries with it a strong implication of scientific methodology. This Methodology can be described as:

1. Formulation of a problem
2. Development of a hypothesis for understanding or solving

The problem (usually in the form of a model)

3. Measurement of relevant phenomena

4, Derivation of a solution or basis of understanding of the

Problem

5- Testing of the results

6. Revisions to reflect the testing of the hypothesis

7. The emergence of valid results

This is necessarily the methodology used in the empirical physical science. These two aspects are central propositions of management and lead to a definition of management science as the understanding and the solution of management problems by the application of scientific methodology.

It should be noted that this definition does not restrict itself to a specific enumeration of techniques. Although management science efforts up to this time have tended to be quantitative; this is not a necessary condition for work in the area of management science. There is no natural dichotomy between quantitative and behavioral or none? Quantitative', efforts.

The techniques applicable to management problems, Such as operations research, econometrics, mathematics, statistics, and the behavioral sciences are all relevant to the area of management science.

The definition of management science proposed here is comprehensive and is intended to include all analytical model building efforts directed at solving and understanding business problems. This will lead to a standard Compatible field of knowledge that will encourage rigorous, productive Analyses of the difficulties of management science.

Management Science Models

Before discussing the types of models used in management science, it would be useful to define what is meant by a model. A model is just"a representation of some or all of the properties of a more extensive system the description could be physical or abstract.

For example, a wooden Model airplane is a physical representation of a more extensive system The Actual real-world aircraft. An alternate model would be a set of blueprints. Which represents the more extensive network?

A third model might be a set of mathematical equations that represent the more extensive system. In management science, four commonly used types of models can be identified:

1. Implicit models
2. Verbal models
3. Logical flow models
4. Mathematical models

The system may be the phenomena underlying the appropriate behavior, or the method may be the decision procedure itself. In this way, a model can be used as a representation of the environment or the environment as viewed through a particular decision procedure.

Implicit models are models that are not made explicit by some communicable form of representation. An implicit model generates all decisions that are not caused by an exact model. This exhaustive classification is based on the premise that the use of a model makes all decisions.

This is not an unacceptable proposition since a "model" was defined in a very general sense as a representation of a more extensive system. With this definition, it is clear that a model makes all decisions since some description of the problem must be perceived before it can be solved or a decision reached. If the model is not recorded incommunicable form, it is an implicit model that remains in the decision maker's cognitive structure until it is communicated and made explicit.

There are several methods of making an implicit model explicit. The first method is to communicate the model in the form of written or spoken words. This representation is a verbal model. The communication of the model is the first step in making it explicit.

An Example of a verbal pricing model may be, "follow the price of the largest firm in the industry unless it would produce losses or the price change does not appear to be permanent." This verbalization of an implicit model exposes the behavioral postulates assumed by the decision model.

The next type of model is the logical flow model. This is an extension of the verbal model by the use of a diagram? The diagram makes explicit

the sequence of decisions to be made and the; the way in which they are related.

The next step in model exposition is to quantify the model's components and the relationships between the elements. This leads to a mathematical model. In the mathematical models, not only the sequence but also the magnitude of the interrelationships is indicated.

In With this model, the existing decision structure and new procedures could be tested. Mathematical models can be described in some ways. Two useful dimensions of classification relate to methods in which the model treats time and risk.

The first classification is divided into segments: static and dynamic. That is those models that do not consider time effects and those that do. The second classification is divided into stochastic and deterministic models. Stochastic models consider risk or probabilistic phenomena while deterministic Models assume certainty of outcomes and events.

The four model types described above may be used compatibly. For example, a mathematical model may be one part of a logical flow model