A DECISION SUPPORT FRAMEWORK FOR BUSINESS COURSEWORK

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ABSTRACT

Many years of teaching courses in information systems, computer applications, and quantitative methods have led to the development of a decision support trilogy. That trilogy consists of a decision making framework, a taxonomy of decision models, and a four-component collection of decision methodologies. This structure can be quite helpful in helping both students and practicing decision makers organize and conduct their problem solving and decision making.

SCIENTIFIC PROBLEM SOLVING FRAMEWORK

First to be presented in this trilogy is what is referred to as the "Scientific Problem Solving Framework" (SPSF). This is essentially a compilation of a number of similar methodologies found in various literatures, including marketing, information systems, statistics, management science, etc. The SPSF consists of three stages: decision making, implementation, and follow-up. The decision making stage (the focal area of the framework) in turn can be considered to include two phases, which are problem definition and alternatives consideration.

Problem definition is comprised of identifying the decision (essentially the decision variables), determining the criteria of importance, addressing whether those criteria represents objectives or if they are better stated in terms of goals (i.e., targets to be achieved), and identifying any constraints need to be considered. Determining the best advertising mix serves as a simple example, where the decision involves the amount of ads to place in each medium during a given week, the amount spent and the ad coverage (number of exposures) are the criteria of concern, the objective is to maximize coverage, and constraints include balancing the ads across the media, as well as not spending more than what is budgeted.

Upon the completion of the problem definition phase, considering alternatives begins with identifying either the alternatives to be addressed or their nature (e.g., finite, infinite, etc.), and proceeds to evaluating them, after which the best one is selected. In the advertising mix example, there are effectively an infinitely many combinations of number of ads and media. Evaluating any alternative (i.e., combination of ads and media) involves estimating the resulting exposure, as well as whether or not that combination is within the constraints. Choosing the best alternative might simply be a matter of evaluating a number of combinations until what seems to be that which leads to highest exposure is identified. Note that, regardless of whether a

quantitative decision or a qualitative decision is involved, the SPSF applies and can be used to help maintain structure in the decision making process and to provide a rational approach to the decision making.

DECISION MODELING CONCEPT

Supporting the SPSF, in particular when a quantitative approach is being used, is the decision modeling concept, and a framework summarizing the components of decision models can be helpful. Essentially, each decision model can be considered as consisting of inputs, outputs (i.e., results), and solutions. This is particularly helpful when spreadsheet software, such as Microsoft Excel or OpenOffice.org Calc, are being used to support the decision making involved. Note that inputs can be further classified as either controllable (i.e., decision variables) or uncontrollable (i.e., the problem parameters), such as unit costs, probabilities, demand estimates, etc.. Outputs are the results of what happens when various values for the decision variables are selected and essentially represent the relationships among the various controllable and uncontrollable inputs. Certainly the results associated with the criteria are included among the outputs, but also results associated with other concerns, in particular the constraints, are involved.

DECISION METHODOLOGIES

Once a problem has been defined and a decision model developed, one or more of four decision methodologies might be employed for evaluating (and sometimes identifying) the alternatives. The least sophisticated of these methodologies is what-if analysis and involves a trial-and-error approach to evaluating various alternatives. This is what spreadsheet software was really designed to do and it does it well, providing a visual, rather than black-box, means of seeing how various aspects of the decision model are affected. Very closely related to each other, goal-seeking and optimization will commonly use mathematical algorithms to reach either target values (goals) or best possible values. While add-ins for spreadsheet software exist and can be somewhat helpful, more powerful software dedicated to this sort of thing is often preferred. All three of these methodologies involve trying to identify the best values for the controllable inputs (i.e., decision variables) that will lead to the best or target value for the criterion outputs. Finally, sensitivity analysis provides a means of addressing the validity of the uncontrollable inputs. Generally a part of the postoptimality portion of the other methodologies, sensitivity analysis will reveal how the solution (i.e., the best combination of values for the decision variables) will change should there be a change in the uncontrollable inputs.

USEFULNESS AND UNDERWHELMING SUCCESS

Together, these three members of the decision support trilogy provide insight for the decision makers and value often well beyond the actual results of employing the various tools involved in solving the models. In addition, the various quantitative techniques, such as decision analysis, simulation, linear programming, inventory analysis, etc. are well categorized, compared, and contrasted by employing this trilogy. However, success has generally been unimpressive in

conveying these concepts and the value of a structured approach to decision making. Too often, business students seem to think that memorizing the elements of these frameworks should be sufficient and thus miss the point of the attempt to organize their approaches to decision making.

CONCLUDING REMARKS AND FUTURE DIRECTIONS

Examples of these, as well as discussion of similar and contrasting approaches to teaching decision support are being developed. Through an open discussion with other academics, as well as possibly practicing decision makers, a major goal of this research is to refine or replace this trilogy. Ideally, the underwhelming success experienced over the years can be supplanted with a means of better preparing students to become successful decision makers in their respective organizations.

REFERENCES

Available upon request from John Seydel