Decision Rules in Selected Management Models

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Thesis Summary

Behavioural scientists have advocated the use of feedback control to improve the performance of systems. The idea of feedback has been used to a significant degree in control theory, but not in the areas of operations research and management science. The objective of this study is two fold. First, to provide the management with some decision rules which have updating provision to incorporate certain information which is not available now but will be available to the decision maker before making final decision i.e. to have a feedback mechanism built into the model. Second, decision rules should have some intuitive appeal to management so that the implementation is considerably easier.

The thesis shows how chance-constraint programming can be used to incorporate certain feedback information into decision making process with the help of a decision rule. The thesis shows that in multi-period decision making under uncertainty, decisions are improved if a feedback element is built into the system. Decision rule approach has been mainly applied in

(1) Production planning and employment scheduling
(2) Investment allocation
(3) Economic Policy
(4) Forecasting models

New Exact and Approximate models for "Reliability Programming approach to production planning" have been presented, which may mean some improvements over existing work. Various decision rules suitable for production planning under different conditions of demand depending upon information in the form of feedback available to the decision maker. Suitable criteria to choose one or two decision rules, which might possibly perform better than other decision rules, are also discussed. Afterwards, the thesis discusses three chance-constraint programming models incorporating the various decision rules into the model and thus building up a feedback element into the models. These models are named as "Decision Rule Models" (DRM). This model is then compared against the well-known HMMS model by using simulation methods and Wilcoxon Matched-pair singled-rank test. It is shown that in such models of multi-period decision making under uncertainty or under mis-specification of distribution of demand, decisions are improved if a feedback mechanism is there in the model. It is also shown that these

decision rule models perform better than HMMS linear decision rules under certain conditions of probabilistic demand.