Business Analysis through Stochastic Modeling – A Theoretical View

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Abstract

Decision making is one of the important activities of the managerial problems. Scientific methodology for quantitative techniques is an essential tool in the contemporary decision making protocols. In this paper an attempt is made to develop a theoretical view on stochastic model on business performance appraisal.

Keywords: Stochastic Modeling, Business Performance; Management Decision Making

Introduction

The paradigms of Decision making procedures have transformed from the conventional methods of Logical and Artistic orientation to Scientific and Technological approaches. Traditionally, the decision making is considered to be a discipline of Art which is serving the cause of Research and Academia as science. The combination of Mathematical language with Statistical theme and Computational assisting programs elevated the decision making process as a technology of the current day to day management problems. Hence the managers have to handle the activities of decision making with a concept of managerial engineering. Activities of an organization have to be thoroughly evaluated from time to time. Regular monitoring on and updating the business activities is a must to any organization. A suitable interface between the management and the employee is very essential to improve the quality of business performance. Performance evaluation is a device to assess the ability of a manager by their managements. The primary goal of a performance evaluation is to provide a quantitative measurement of a component's contribution to the whole sys-tem. Quantity of the managerial activity is a measure of the organizational efficiency. It is playing a pivotal role in speculating and computing the growth indicators. Hence, modeling the decision making activity is an absolute need of an organization.. A healthy management sys-tem is a result of the effective performance of its internal managerial setup. We may not come across the same/ similar situations for all decision making issues. It can provide an appraisal protocol between the employee and the employer.

The Necessity of Stochastic Model

As the job of the manager for decision making is considered to be more uncertain, the performance of a business may be accessed through a suitable evaluation model. Decision making of the present day's management problems is an embodiment of Stochastic Processes, theory of Probability and other related with mathematical aspects management issues. Hence, measuring the business performance through the Modelling is one of the important thrust areas in Management Research methods. The methods of decision making may have manifold objectives. The precision of decision making can be quantified by means of statistical techniques. The amalgamation of Mathematical, statistical and managerial programs be-came the prime concern of a researcher of decision science. Development of an evaluation format, identification of performance parameters, designing the guide lines for getting feedback, setting up of evaluation schedules etc. are the important activities of management problems.

The computational alternative to simulation for a large class of stochastic management models by involving functions of random variables, were handled to deal the problems like risk analysis The critical assumptions in concurrency control performance modelling were investigated for managerial decision making issues. The Productivity situations of sales members by modelling their sales on periodic evaluation were carried out for assessing capability of business activators. Numbers of mathematical models were suggested to

measure the financial performance of economic firms. Benchmark performance for assessing the practices of risk management were developed for evaluating the abilities of the portfolio managers. Hierarchical control frame works were developed to solve performance management problems in distributed computing systems operating in a data centres. Performance appraisal system using multi-factorial evaluation model in dealing with appraisal grades were developed and expressed in linguistic terms. Development of Generalised Stochastic Petri Nets (GSPN) model was the breakthrough for performance evaluation in business processes. The experimental driven models with Gaussian approach were developed for data base studies using the online performance analysis. Tele communication service management systems using server models with load dependency were developed to study the database servers with suitable performance models. Simulation based performance evaluation of mobility management schemes using target communication system modeling and traffic modeling was carried out.

The computation of business performance with conventional methods based on psychometric measures is being used by many researchers. The above research review has given much emphasis on Psychometric approach for measuring the performance of a business. These approaches have the limitations as they are not supported by proper classical mathematical theories and they are considered to be non-parametric studies. As decision making problems are mostly influenced by uncertainty factors and probabilistic assumptions, development of modelling is more appropriate for measuring the performance of a manager. Even though the philosophy of performance evaluation has been applied in many decision making problems deals with machines, databases, Industries, administrative organizations, etc., very little work has been reported on measuring the performance of manager using mathematical formulations and model based. Computing the performance of a manager through stochastic models is quite rational as these methods are considered to be parametric and justified with competent probability theory.

The Basic Steps of Stochastic Modeling

The essential steps in building stochastic models are:

i) Identifying the sample space;

ii) Assigning probabilities to the elements of the sample space;

iii) Identifying the events of interest;

iv) Computing the desired probabilities.

The Application in Business

Stochastic modeling concerns the use of probability to model real-world situations in which un-certainty is present. Since uncertainty is pervasive, this means that the tools of this course can potentially prove useful in almost all facets of one's professional life (and sometimes even in one's personal life):

- Gambling
- Personal Finances
- Disease Treatment Options
- Economic Forecasting
- Product Demand
- Call Center Provisioning
- Product Reliability and Warranty Analysis, etc.

The use of a stochastic model does not imply that the modeler fundamentally believes that the system under consideration behaves "randomly". (For example, the behavior of an individual may appear "random". But an interview with that individual may reveal a set of

preferences under which that person's behavior is then revealed as totally predictable.) Use of a stochastic model reflects only a pragmatic decision on the part of the modeler that such a model represents the best currently available description of the phenomenon under consideration, given the data that is available and the universe of models known to the modeler.

Conclusion

Formal models and analytical methods are a pre-requisite to arrive at or evaluate appropriate action choices for business or commercial decisions in a competitive environment. The intensity of competition and the sophistication of the model would require the usage of stochastic elements in model for business performance evaluation.

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