

# Editorial

This second issue of ORiON Volume 23 contains five interesting operational research papers, ranging considerably in nature from a practical special case study and stochastic inventory models to statistical analyses and a state-of-the-art literature review.

In the first paper, titled *A procurement decision model for a video rental store — A case study*, Basie Kok and James Bekker address the challenge of providing decision support with respect to procurement decisions in a video rental store. The majority of classical inventory management principles are inappropriate for use in this context, since the commodities (movie titles) are removed from, and after a certain time period, returned to inventory. The commodities also experience a decaying demand in general, and hence the video rental store owner (the decision maker) is required to procure new titles periodically under severe budgetary constraints. The question addressed in this paper is that of determining which movie titles to acquire, and how many copies of each, in order to maximize expected profit from renting out the resulting titles, whilst remaining within a predetermined budget. An exponentially decaying demand function is employed, and attributes of movie titles in inventory are used to classify candidate movie titles and predict their future demand. Procurement suggestions made by the model are evaluated and compared to the actual decisions made by the store owner, based on January 2004 – June 2006 transaction data and using realized and expected turnover as measures of performance. The authors demonstrate that significant improvements could have been achieved had their model been in use in the store during the last six months of 2006.

The second paper, by Alta de Waal and Tom Ritchey titled *Combining morphological analysis and Bayesian networks for strategic decision support*, contains a brief overview of morphological analysis (MA) and Bayesian networks (BNs) within the context of strategic decision support modelling. MA may be used to define, link and evaluate problem spaces, whilst BNs are graphical models which consist of a qualitative and quantitative part. The qualitative part is a cause-and-effect, or causal graph. The quantitative part depicts the strength of the causal relationships between variables. The authors argue that combining MA and BNs, as two phases in a modelling process, allows one to gain the benefits of both of these methods, namely defining, linking and internally evaluating the parameters of problem spaces (the strengths of MA) and facilitating the definition and quantification of causal relationships between variables (advantages of using BNs). The authors lucidly describe how the two computer aided approaches of MA and BNs may be combined to better facilitate modelling procedures. A simple example of the use of MA and BNs is also presented, based on a recent application in the field of environmental decision support.

The third paper, titled *Variable selection in multiple linear regression: The influence of individual cases*, by Sarel Steel and Danie Uys is a study of the influence of individual cases in a data set when variable selection is applied in a multiple linear regression setting. The authors introduce two influence measures, based on the well-known  $C_p$  criterion and Akaike's information criterion. The relative change in the selection criterion, when an individual case is omitted, is proposed as a measure of the selection influence of the specific omitted case. It is argued convincingly that the selection procedure can be improved by taking the selection influence of individual data cases into account. The authors motivate

their thesis by computating the selection influence of cases for four numerical examples based on well-known data sets from the literature.

In the penultimate paper, titled *Stochastic inventory management at a service facility with a set of reorder levels*, Sarma Yadavalli, Balasubramanian Sivakumar and Gunaseelan Arivarignan study a continuous review perishable inventory system at a service facility where there is a finite waiting capacity. The customers arrive according to a Markov arrival process and the life times of the items and the service times are assumed to have independent exponential distributions. Unlike the conventional approach of placing replenishment orders when the inventory reaches a predetermined level, the authors consider a set of reorder levels with specified probabilities for placing orders at a particular reorder level. This allows for the modelling of a situation where the decision maker may advance or postpone the placement of reorders as a result of his/her experience with respect to past supply scenarios. The reordering quantity depends upon the reorder level at which an order was triggered and the lead time is negatively exponentially distributed. The authors obtain a joint probability distribution of the number of customers in the system and the inventory level in the steady state. They also derive a number of stationary system performance measures and demonstrate application of their inventory management strategy in the form of a numerical example.

In the final paper, titled *Threat evaluation and weapon assignment decision support: A review of the state of the art*, Jaco Roux and Jan van Vuuren present a concise review of literature on threat evaluation and weapon assignment decision support within the context of a ground based air defence (GBAD) system (GBADS) up to the end of the twentieth century. In a military environment an operator is typically required to evaluate the tactical situation in real-time and protect defended assets against enemy threats by assigning available weapon systems to engage enemy craft. This environment requires rapid operational planning and decision making under severe stress conditions, and the associated responsibilities are usually divided between a number of operators and computerized decision support systems that aid these operators during the decision making processes. The aim in this paper is to review the state of the art of GBAD threat evaluation and weapon assignment decision support. However, much of the contents of the paper may be generalized to military environments other than a GBADS.

As always, I am confident that the diversity and quality of the five papers in this issue are such that each reader of ORiON will find something suiting his/her particular tastes and interests.

I would like to thank the eleven authors who contributed their interesting work to Volume 23(2) of ORiON — the readership of ORiON are encouraged to continue utilising ORiON as publication vehicle for their research. My sincere thanks also go to the ten anonymous referees who generously gave of their time to evaluate the papers in this issue timeously and in a very professional manner; they have made valuable suggestions which have led to a substantial improvement in the quality of papers in virtually all cases. Suggestions and comments on publications in ORiON, in the form of letters to the editor, are welcome and may be published in future issues of the journal.

My thanks also go to Adri van der Merwe, editorial assistant, who has made my life considerably easier by assuming much of the administrative duties involved in managing

the submission and refereeing processes — thereby freeing me to focus my time and efforts on the identification of appropriate referees, on issues surrounding publication decisions and on high-level strategizing for the journal. Thank you also to Associate Editor John Hearne for managing the refereeing process of the last paper in this issue so timeously and professionally on my behalf. Finally, I would like to thank the business manager, Stephan Visagie, for his usual high standards and considerable patience during the typesetting process of the manuscripts in L<sup>A</sup>T<sub>E</sub>X and for overseeing the time-consuming publication process of this issue.

Jan van Vuuren  
December 2007