

Editorial

This volume contains ten exciting papers varying considerably in topic and in nature, as one has come to expect from an Operations Research journal. In fact, the bulk of the papers were such that the volume is published as two separate issues, each comprising five papers — thereby eradicating the backlog of ORiON.

The first paper in this volume, titled *Confidence limits for expected waiting time of two queuing models*, contains a derivation of a maximum likelihood estimator, a consistent asymptotically normal estimator and asymptotic confidence limits for the expected waiting time per customer in queues of type $M|M|1|N$ or type $M|M|1|\infty$. These basic queue types are often used in simulation models, yet the results achieved in closed form by Sarma Yadavalli, Kris Aderdorff, Gert Erasmus, Pinchika Chandrasekhar and Srinivasan Deepa, are usually computed numerically via experimentation by modellers. Hence the results in this paper will, no doubt, be useful to readers and practitioners who are, from time to time, involved in applications of simple queuing system models.

In the second paper of this volume, titled *A bio-economic application to the Cape Rock Lobster resource using a delay difference modelling approach*, Elmari Roos expands on previous harvesting models for dioecious fisheries based purely on biological considerations (such as recruitment, sexual maturity, survival and mortality rates), by also incorporating economic notions. She goes on to apply this bio-economic model to the Cape Rock Lobster resource *Jasus lalandii*, based on catchment data for the species over the period 1900–1995 obtained from the South African Marine and Coastal Management. In the process she formulates an optimal harvesting policy for the resource that maximises the present value of all future net revenue associated with the species, subject to the biological parameters of the lobster. This paper demonstrates unequivocally that the incorporation of economic aspects into a fishery harvesting model, as opposed to a mere biological approach, may affect policy recommendations significantly, as is indeed the case with the Cape Rock Lobster.

Stephan Visagie, Hennie de Kock and Amanuel Ghebretsadik adopt a novel approach toward farm planning in the third paper of this issue, titled *Optimising an integrated crop-livestock farm using risk programming*, by employing methods traditionally associated with financial portfolio theory and investment opportunities. They argue that a farmer is subjected to some level of risk, depending on a complex array of factors, such as weather and market conditions: therefore a farmer cannot merely plan farming activities so as to maximise expected return — this should be done subject to the amount of risk that the farmer is willing to bear. They employ a minimisation of absolute deviations (MOTAD) approach to trace out the efficient set of (risk, return) pairs for feasible farm plans, similar to the efficient frontier of Markowitz in his landmark 1952 paper. In their clever linear approach they side-step the quadratic component usually introduced into models of risk and return by the presence of variance and covariance terms, whilst still incorporating the inter-dependencies between risk and return in their model constraints. Their comprehensive farm planning model is capable of providing answers, at a specified level of exposure of the farmer to risk, to questions such as what rotary cropping strategy to implement and how much land to allocate to such a strategy, what amount of feed to

mix for livestock, what proportion of crops to sell and what to keep towards self-sufficiency of the farm in terms of animal feed, how much additional resources to hire, and how many livestock to keep on the farm. The paper is concluded with a case study, applying their model to a farm in the Swartland agricultural region.

In the fourth paper of this issue, titled *An analysis of the South African fruit logistics infrastructure*, Esbeth van Dyk and Emma Maspero describe a large-scale project involving many stakeholders, in which the aim was to promote effective logistics operations amongst all the role-players in the South African fresh fruit supply chain, and to make recommendations for the utilisation of, and investment in, logistics infrastructure in order to enhance the competitiveness of the South African fruit export industry. The study spanned one year, was funded by the South African Department of Trade and Industry and was conducted by the CSIR in conjunction with the University of Stellenbosch (through a number of masters theses) and the consultants Optimal Agricultural Business Systems. A fascinating account of the project, its objectives, its highlights and pitfalls is given in the paper. The authors describe how a code of good conduct was established for the industry, how feasibility studies and sensitivity analyses were conducted to test the consequences (in terms of cost-effectiveness) of diverting certain fruit volumes from their current supply chain routes to various alternatives during the export process, and how the capacity of the industry's supply chain was analysed and estimated. The paper is the first in a series of three planned by the authors.

The final paper of this issue, titled *School results and access test results as indicators of first-year performance at university*, contains a dire warning by Adél Bothma, Ludolph Botha and Niël le Roux that there exists a very high degree of unpreparedness among many prospective students, in terms of what is expected of them on university level. This is aggravated by current, abnormally high school marks creating an unrealistic expectation of performance during the first year at university. The authors use a number of interesting statistical techniques to investigate the relationship between grade 11 and 12 school marks, university access test results and first year university marks for samples of students in the 1999, 2000 and 2001 intake groups at Stellenbosch University to show that, although there is some correlation between school marks and university performance, school marks only explain a small proportion of the variation of first year marks. Yet university access tests which, in the view of many, are being designed at various institutions with a view to ultimately eliminate the need for consideration of (uncalibrated) school marks during the university admission procedure, admittedly convey important information regarding the preparedness of prospective university students, but currently do not go far enough in discriminating satisfactorily between *potentially* successful and unsuccessful candidates.

The diversity and quality of the five papers contained in this issue of ORiON certainly bear witness to the excellent and wide-spread operational research activity currently in South Africa! I am confident that each reader of ORiON will find something interesting suiting his/her tastes, no matter what kind of operations research he/she practices.

A few thanks are certainly due. I would firstly like to thank the twelve authors who have contributed their interesting work to Volume 20(1) of ORiON — your support of ORiON is invaluable — please continue to utilise ORiON as publication vehicle for your research. Secondly, my thanks go to the nine anonymous referees who have generously given of their

time to evaluate the papers in this issue timeously and to suggest valuable improvements, which have invariably led to a substantial improvement in the quality of papers. Thirdly, my sincere thanks go to the associate editors for their assistance in helping to manage the refereeing process. Finally, I would like to thank the business manager, Stephan Visagie, for his pains to oversee the L^AT_EX typesetting of the manuscripts and the publication process — your hard work has clearly paid off in the form of an efficient instrument of high quality for the Operations Research Society of South Africa!

Jan van Vuuren
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