

Editorial

The quality and range of topics of the five papers contained in this issue of ORiON will again surely provide something of interest and use to all the tastes of operations researchers in Southern Africa.

The first paper in this issue, titled *Robustness studies on coal gasification process variables*, contains an application of the method of factorial experimental design to the process variables at one of the 97 Sasol-Lurgi fixed bed dry gasifiers at Secunda. In this paper Roelof Coetzer and Martin Keyser determine the most efficient sustainable combination of process variables that govern gasification, by means of statistical robustness studies. The two main process variables in their study are the stone content of the coal used for gasification and the particle size distribution (PSD) of the coal. It turns out that both these variables may not simultaneously be fully controllable during the gasification process, as had previously been assumed in models. The authors consider two scenarios; in the first scenario it is assumed that the stone content is hard-to-control whilst the PSD is accurately controllable, and in the second scenario the converse is assumed. Under these conditions, the authors demonstrate that sustainable high pure gas yield production, as well as lower oxygen consumption per volume of pure gas produced, may be achieved by reducing the coarse fraction of PSD fed to the gasifier. Another important result of the paper is that higher oxygen loads cannot be achieved if PSD fractions are hard-to-control: For stone content as hard-to-control, and PSD as controllable, the operability region for improved sustainability and throughput is significantly expanded towards higher loads.

In the second paper of this issue, titled *A single product perishing inventory model with demand interaction*, Sarma Yadavalli, Chris van Schoor, Johan Strasheim and Swaminathan Udayabaskaran construct a single perishing product inventory model in which items deteriorate in two phases and then perish. They assume that independent demand takes place at constant rates for items in both phases — demand not satisfied for an item in phase I may be satisfied by an item in phase II, based on some probability measure, whilst demand for items in Phase II is lost during stock-out. Drawing from results in renewal theory, the authors derive the probability distribution of the inventory level as a function of time and proceed to establish an optimal, adjustable (S, s) replenishment policy under a variable (stochastic) lead time. Expressions for the mean stationary rate of lost demand, the substituted demand and the number of perished items are also provided. Finally, the working of the model is illustrated by means of a numerical example.

Steeds op die onderwerp van voorraadbeheer, volg Stephan Visagie in the derde artikel van hierdie uitgawe, getiteld *Prysverlagings op voorraad met 'n dalende vraag*, 'n interessante benadering tot besluitnemingsteun aan kleinhandelaars van “bederfbare” produkte waarvan die rakleef tyd moeilik bepaalbaar is. Anders as in die geval van vrugte (waar die rakleef tyd 'n funksie van varsheid is) of klere (waar die rakleef tyd tipies goed afgebaken en seisoenaal is), is die rakleef tyd van byvoorbeeld 'n musiek CD moeilik bepaalbaar, aangesien dit 'n funksie van 'n aantal moeilik kwantifiseerbare faktore is, soos die kunstenaar of groep wat ter sprake is, die tyd wat kettinggroepe aan advertensies vir die spesifieke CD afstaan, die hoeveelheid lugtyd wat die CD op radio en televisie ontvang, die ouderdom van die CD, en of (en wanneer!) die kunstenaar of groep 'n konserttoer gaan onderneem. Die outeur ontwikkel twee heuristieke waarmee die kleinhandelaar kan bepaal op watter

tydstippe om die pryse van sulke “bederfbare” produkte te verlaag (en sodoende aanvraag te stimuleer) en wanneer om liever te poog om, deur middel van ’n uitverkoping, van die produkte ontslae te raak. Die werking en doeltreffendheid van hierdie twee heuristieke word in ’n gevallestudie op ’n CD winkel toegepas en gedemonstreer.

In the fourth paper of this issue, titled *Decision Making: Theory and practice*, Marita Turpin and Mario Marais compare a total of nine models of decision-making (such as the rational model and the model of bounded rationality put forth by Simon, Lindblom’s incrementalist view, the organisational procedures view of March, the political view of Pfeffer and others, the garbage can model of Cohen, March and Olsen, and the multiple perspectives approach of Mitroff and Linstone) with the style of decision-making by six prominent South African CEOs, directors and managers. The authors start by summarising what they have learnt about the styles of these decision makers during interviews with them on how they go about making decisions, and then the authors go on to classify the decision-makers according to the models they (often implicitly) use, in a comparative fashion. Although certain central themes emerged during these interviews, significant variation was also encountered. Some of the main patterns that emerged, was the importance of sensitivity to the particular decision-making context, attention to the presentation of information, the use of intuition and the wide-spread use of self-help software tools.

The final paper of this issue, by Niël le Roux, Adél Bothma and Ludolph Botha, is titled *Statistical properties of indicators of first-year performance at university* and is a follow-up to the final paper in Volume 20(1) of ORiON, in which the same authors investigated 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. Using kernel density estimates, the univariate distributions of the variables concerned are described in some detail. Bagplots are used to display, in two-dimensional fashion, certain important features, such as location, spread, correlation, skewness, outliers and tails of bivariate distributions composed of a school mark variable and a university performance variable. The authors provide evidence that certain access tests at Stellenbosch University (such as the Mathematics, Science and Numeracy Skills test) have statistical distributions not too dissimilar to that of first-year university performance, but that average school marks cannot be trusted to discriminate between potentially successful and unsuccessful university students.

I would like to thank the twelve authors who have contributed their interesting work to make up Volume 20(2) and for supporting ORiON — please continue to utilise ORiON as publication vehicle for your research. My thanks also go to the ten anonymous referees who have generously given of their time to evaluate the papers in this issue timeously and to suggest valuable improvements, which have certainly led to a substantial improvement in the quality of papers. Furthermore, my sincere thanks go to the associate editors for their assistance in helping to manage the refereeing process. Finally, I would again like to thank the business manager, Stephan Visagie, for putting up with numerous demands from my side under extreme pressure of work.

Jan van Vuuren
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