

# *Editorial*

This final issue of ORiON Volume 24 contains five interesting papers, again spanning a substantial portion of the wide operational research spectrum, from practical studies to the establishment of theoretical results and the development of new methodology.

In the first paper, titled *Portfolio selection theory and wildlife management*, John Hearne, Truly Santika and Peter Goodman, consider the potential of portfolio selection theory, first suggested by Markowitz [3] in 1952, to determine the optimal mix of species on a game ranch. In this fascinating application, land, or more accurately the food that it sustains, is the resource available to “invest,” while the various game species (with their unique return and risk profiles) are the “investment alternatives.” The authors solve the problem of deciding what proportion of the available resource is to be invested in each species. They show that if the objective is to minimise risk for a given return, then the problem is analogous to the portfolio selection problem. They also demonstrate the applicability of their approach using typical data for a hypothetical game ranch. The authors conclude that it is necessary to include a third objective in addition to the usual risk and return objectives, so as to ensure sufficient species to maintain the “character” of a game ranch, in terms of the resulting overall quality of the viewing or hunting experience of visitors to the ranch.

The second paper, by Babul Hasan and John Raffensperger titled *Two pricing methods for solving an integrated commercial fishery planning model*, contains two novel pricing methods for solving an integer programming problem. The authors demonstrate these methods by solving an integrated commercial fishery planning model (IFPM) previously published in ORiON [2]. The aim in this model was twofold: (i) to schedule fishing trawlers (*i.e.* to determine when and where the trawlers should go fishing, and when the trawlers should land their catches), and (ii) to decide how to process the landed fish into products at a processing plant so as to maximise profit. Whereas production planning alone would result in an easy linear programming problem, the introduction of a trawler scheduling aspect into the IFPM results in a hard integer program (in the sense that traditional solution methods involve computation times that are far too long to be practical). The two pricing methods developed in this paper are a decomposition-based O’Neill pricing method and a reduced cost-based pricing method. The authors demonstrate the working of these approximate solution methods by means of numerical examples for different planning horizons, considering differently sized problem instances, and concluding that these methods are indeed viable in terms of their execution times when considering a realistic instance of the IFPM.

In the third paper, titled *The identification of possible future provincial boundaries for South Africa based on an intramax analysis of journey-to-work data*, Hannelie Nel, Stephan Krygsman and Tom de Jong use the intramax method and a combination of national census data on place of residence and place of work to identify functional regions in South Africa, based on journey-to-work flows. They describe how these functional regions may be used to demarcate sensible provincial boundaries or provide solutions to disputed areas. The authors briefly review the process that was followed in 1993 to demarcate the current provincial boundaries and go on to propose new boundaries for a four or five province

regime, based on the intramax analysis of the journey-to-work flow data mentioned above. They also put forward practical solutions to a number of split-municipality and disputed region problems that have surfaced in the media over the past few years. Their results compare favourably with those from principal component and cluster analyses [1] previously used to demarcate the South African space economy into a hierarchy of development regions.

The topic of the fourth paper, titled *A survey and comparison of heuristics for the 2D oriented on-line strip packing problem* by Nthabiseng Ntene and Jan van Vuuren, is the two-dimensional oriented on-line strip packing problem in which it is required that items be packed, one at a time without rotation or overlap, into a strip of fixed width and infinite height so as to minimise the total height of the packing. The authors review ten heuristics from the literature for the special case where the items are rectangles, propose six modifications to some of these heuristics, and present two entirely new shelf algorithms for this class of strip packing problems. They then go on to compare the performances and efficiencies of all the algorithms in terms of the mean packing height achieved and computation time required when applied to 542 benchmark data sets documented in the literature. They find that two of their proposed algorithmic modifications outperform most of the reviewed algorithms in the literature if the packing data set satisfies certain conditions in terms of the aspect ratios of the rectangles to be packed.

In the final paper, titled *The Steiner ratio for points on a triangular lattice*, Oloff de Wet presents a novel, short proof that the Steiner ratio for points on a triangular lattice in the Euclidean plane is  $2/\sqrt{3}$ . The Steiner ratio is an efficiency measure of how badly a *minimum* spanning tree performs compared to a Steiner *minimal* tree. This kind of efficiency finds important applications in, for example, the design of integrated circuit boards, communication networks, power networks and pipelines of minimum cost. In the proof, a Steiner tree in two dimensions is “lifted” to become a rectilinear tree in three dimensions, where it is suitably altered. Proof of the result readily follows for the altered rectilinear tree, which is then projected back into the plane. This beautiful proof is a classic example of the seeming contradiction that it may be exceedingly difficult to prove a result in a confined or special case setting, but much easier to prove a more general result (by relaxing the setting confinement), which admits the original result as special case.

I trust 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. 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.

In January this year an international Advisory Board was appointed for ORiON, comprising fourteen operations researchers from Canada, England, France, India, Italy, New Zealand, the Philippines, South Africa, and the United States of America (these individuals are listed in the front cover of the journal). An electronic copy of ORiON will be sent to these board members every six months and it will be the task of the Advisory Board to advise the Editorial Board on the standard of papers accepted (on a post-publication basis) and also to help settle refereeing disputes in their areas of expertise. The Board will also lend international standing to the journal. An electronic copy of Volume 24(1) went out the Advisory Board in June this year, and the board members are thanked for the

invaluable feedback received, including excellent assessments with respect to the standards of papers that appeared in the Volume 24(1), as well as a wealth of practical advice and sensible suggestions with respect to style, typesetting and general strategizing.

I would also like to thank the eleven authors who have contributed their interesting work to Volume 24(2) of ORiON. My sincere thanks also go to the ten anonymous referees who have generously given of their time to evaluate the papers in this issue timeously and in a very professional manner; their excellent work has led to substantial improvements in the quality of papers in virtually all cases.

My thanks also go to Adri van der Merwe, editorial assistant, who assumes much of the administrative duties involved in managing the submission and refereeing processes of manuscripts. I would also like to thank Philip Fourie who has assisted me with meticulous proofreading of the papers contained in this issue — his time and expertise are much appreciated. Thank you also to Associate Editor John Hearne for managing the refereeing process of the penultimate paper in this issue so timeously and professionally on my behalf.

Finally, I would like to thank the business manager, Stephan Visagie, and his typesetting assistant, Lieschen Venter, for their high standards and considerable patience during the nontrivial 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  
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## References

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- [2] HASAN MB & RAFFENSPERGER JF, 2006, *A mixed integer linear program for an integrated fishery*, ORiON, **22(1)**, pp. 19–34.
- [3] MARKOWITZ HM, 1952, *Portfolio selection*, Journal of Finance, **7**, pp. 77–91.