NEWSLETTER

Operational Research Society of New Zealand (Inc.)

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Jonathan Lermit ✍ Electricorp, P.O. Box 930, Wellington

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June 1990

26th Annual Conference

OR: Serving the Community in the 1990's

University of Waikato, Hamilton.

Monday and Tuesday, 20 and 21 August, 1990

There has been an excellent response from members and 20 papers have been accepted, in addition to our two overseas speakers. Many papers are on the applications of OR; in Agriculture, Electricity, Forestry and Oil. There are also papers on OR techniques, and a panel session devoted to OR education.

All members of the Society should have received a conference brochure, which includes a registration form.

Important dates are:

- 27 July - closing date for accommodation bookings
- 10 August - late fee applies on any registration
- 19 August - informal pre-conference evening
- 20-21 August - conference

Enquiries, Registrations and Papers to:

John Buchannan, Paul Cragg, or Les Foulds ☎ (071) 562889
Department of Management Science & Systems
University of Waikato Fax: (071) 384063
Private Bag, Hamilton

Student Paper Competition Entries

To give the work of our students the recognition it deserves, (and to raise the intellectual tone of this publication), we are proud to publish the abstracts from the annual Student Paper Competition. The winning papers will be presented at the Conference. The abstracts have been (slightly) edited to fit the space available. Congratulations to the winners, and a big thanks to all the students who entered, and to their supervisors.

First Prize

A Multiple Stock Location Model for a Maintenance Parts Inventory

John Hurst
Victoria University of Wellington

The project was concerned with the multiple stock location inventory problem, in a form which allows referrals to be passed to any location in the system, depending only on cost and availability. The main idea of the project is to avoid the common approach to the multiple stock problem, which arranges the locations in a hierarchy and places restrictions on the propagation of demand. This project generalises the idea of propagation of demand.

A model is presented which predicts the values of: The Parts Availability Level, The Average Availability Level, and The Number of Orders per time period.

The model is based on the matrix giving the average flow of parts (demands) between each pair of locations in the system. The propagation of demands through the system is described by the matrix. An algorithm for finding this matrix is given.

Second Prize

Branch Staff Management for Trustbank Canterbury

Ian J. Jackson & Kerry A. Mayes
University of Canterbury

This report is a study of the various aspects of the staffing of bank branches for Trustbank Canterbury. Staff are a major expense in operating a branch

network. The efficient management of this staff is therefore important to ensure that the cost is achieving a good return.

This report examines two of the main areas of branch staff management, teller staffing and staffing an enquiries counter. We have continued the work of a previous study to address the question of finding staffing levels, both for full and part time staff, and scheduling the part time staff.

Milk Meter Impact Evaluation

D. N. Clark & J.V. Woolley
University of Waikato

To improve their Heard Testing services Livestock Improvement Corporation Limited plan to design and introduce a new milk meter which incorporates the latest technology in data capture and sampling. The purpose of this study was to evaluate the impact of a series of potential new milk meter designs on the Herd Testing Operations.

First, the potential new meter options were designed in a series of meetings with key personnel. The characteristics of each meter option were documented, and resource and data flows associated with each option identified. To quantify the impacts of the options on resource levels, and to determine their cost implications, a spreadsheet model was built for each option. To incorporate qualitative factors in the assessment, pairwise comparisons were made for a series of key issues.

Optimal Stratification for Multivariate Stratified Sample Surveys

Martin Hamilton & David Lovatt
University of Canterbury

The New Zealand Department of Statistics designs multivariate stratified sample surveys for clients. The design must achieve certain accuracies (for several variables) within both a series of categorical breakdowns of the population and over the population as a whole, while minimizing the sample size and hence the cost of the survey.

To do this, optimal definitions of strata within each category must be determined. Members of the population are classified to each stratum on the basis of some auxiliary variable (that is a variable which is not part of the survey).

The aim of the study was to determine a suitable method of optimal stratification.

Prediction of Corrosion Levels

Sarah M. Harper
Victoria University of Wellington

The Building Research Association of New Zealand has been investigating the corrosion levels of metals for different parts of the country. Metal samples were left exposed for approximately thirteen months at 167 sites around the country. The weight loss of the samples scaled over the time period gave an indication of the amount of corrosion taking place.

This project uses regression techniques to examine relationships between corrosion and various geographical and meteorological variables. The most important variables found are the distance of the site from the sea, the altitude, the amount of frost and the evaporation level.

Wind directions are also examined and a reasonable model is found by scaling the percentage of time that wind is coming from each direction, by the distance to the sea in that direction.

Staff Modelling in EEO Decision Making

Matthew F. Hobbs
Victoria University of Wellington

Decision making in Equal Employment Opportunity involves choosing the best programme option in order to best achieve a certain objective under certain constraints. This involves prediction into the future of the representation within the organization of the target group. Usually the decision making process would involve the management basing their conclusions on experience, judgement and basic summary statistics.

This project represents an attempt to develop a methodology to design an accurate quantitative aid to the decision making process. The concept is to understand the structure and processes within the personnel situation of an organization and then use this information to build a model to predict the future representation of a target group under various programme options. The programme option option with the better predicted target group representation is the option recommended by the model. The recommendations from an accurate model can be used to help in the decision making process.

A Dynamic Production Planning Model for the Horticultural Industry

Andrew Taylor
University of Auckland

The aim of this project was to develop a dynamic model for planning horticultural production. This is a linear programming model which is specifically designed to solve planning problems and to be used as a decision-making tool for management. The goal is to calculate the production mix of plants required to maximise profit. As well as producing an optimal production strategy, the model provides valuable information about the utilisation of the nursery. A major advantage of the dynamic model is that it is flexible enough to be able to cope with changing market and nursery conditions.

This report outlines the development of the dynamic model and illustrates its various features. One of these is the ability to review past decisions. The facility is useful when, for example, changing market conditions cause a decision made in the past to become undesirable. The effects of employing this procedure are investigated and discussed. Suggestions for possible extensions to the model are also proposed. Finally, the value of the model and its potential in the horticultural industry are discussed.

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Subscriptions

If you have not paid your subscription, please do so promptly. Members who are more than one year in arrears are liable to be suspended.

Another happy event.

We are happy to announce the birth of **Tanya Michelle** to Pru & Mike **Saunders**. Mike, now resident in California, and well known for his work in Mathematical Programming, will be visiting NZ with his family later this year.

Thanks to everyone who sent in information for this newsletter, we could do with some more news from the branches.

National and International Events

Find out what's going on in the big w i d e world

Statistical Process Control - the American way
Steeple Conference Centre, Quality Inn, Palmerston North

26 - 29 June 1990

- Variability happens of its own accord - Quality needs your help
- Control your quality the Statistical Process Control way.
- Be able to demonstrate this to purchasers
- Increase your profitability by reducing your variability

Contact: Department of Production Technology, Massey University

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Operations Research for Conservation, Development and Planning
21st Celebration Conference of the OR Society of South Africa
Kruger National Park Game Reserve, South Africa

15-17 August 1990

Contact: Gordon Erens
Department of Quantitative Management
University of South Africa
P.O. Box 392,
Pretoria 0001, South Africa

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IFIP international Conference on Advances in Production Management Systems
Helsinki, Finland

20-22 August 1990

Contact: Prof. Raimo Haemaelaeinen
Helsinki University of Technology
Otakaari 1A,
SF-2150 Espoo, Finland

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Sixth International Symposium on Inventories
Budapest, Hungary

27-31 August 1990

Contact: Attila Chikán
Veres Pálné u. 36
Budapest Fax: (36-1)-117-8883
H-1053, Hungary

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OPERATIONS RESEARCH 1990
International Conference on Operations Research
Vienna, Austria

28-31 August 1990

Contact: Prof G. Feichtinger
Institut für Ökonometrie
OR und Systemtheorie
Technische Universität Wien
A-1040 Wien, Argentinierstraße 8

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1990 International Conference
Operations research/Management Science: Techniques & Applications
Manila, Phillipines

11-14 December 1990

Contact: Ms Elise de Rosario
San Miguel Corporation
40 San Miguel Avenue, Mandaluyong
Metro Manila, Philippines

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First IFORS specialised conference
DECISION SUPPORT SYSTEMS
Bruges, Belgium

27 - 29 March 1991 (Tutorial - 26 March)
Deadline for Abstracts - 1 July 1990
Contact: Prof J.P.Brans, IFORS SPC 1
VUB CSOO, Pleinlaan 2, B-1050 Brussels, BELGIUM

IFAC 9th Symposium on Identification and System Parameter Estimation
Budapest, Hungary

1-6 July 1990

Contact: Dr Margit Zierman
Levay u. 9/A, H-1022 Budapest, Hungary

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The European Congress on Operational Research
EURO XI
Aachen, Germany

16-19 July 1991
"Operational Research methods for supporting high technologies in the emerging Europe"

Contact: Prof. Dr H.J. Zimmermann
Operations Research
Templegraben 64, RWTH Aachen
5100 Aachen, Germany

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14th International Symposium on Mathematical Programming
Amsterdam, The Netherlands

5-9 August 1991

Contact: 14th International Symposium on Mathematical Programming
Paulus Potterstraat 40
1071 DB Amsterdam, The Netherlands

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APORS '91
2nd Conference of the Association of Asian-Pacific OR Societies
Beijing, China

27-30 August 1991 Deadline for Abstracts: 1 August 1990.

Contact: Prof Weiwu FANG
APORS '91 Secretariat
c/- Institute of Applied Mathematics
Chinese Academy of Sciences
P.O. Box 2734, Beijing 100080, China

Overseas Visitors

The following visitors will grace our shores sometime during the next twelve months. Hans Daellenbach can supply more details.

Prof H. Larson, Naval Postgraduate School, Monterey, California.
April - December 1990, "basically a statistician".

Dr Paul Appiah, all 1990, OR in mining engineering.

Prof Mike Saunders, Stanford University, California.
July-August 1990, Mathematical Programming

Prof Roger Wets, University of California, Davis
Here for the Applied Mathematics Conference, February 1991
Stochastic Programming

Dr Rob Womersley, Applied Mathematics Dept, University of NSW.
Here for the Applied Mathematics Conference, February 1991
Practical aspects of non-smooth optimisation.

If any branches would like these people to visit them, please talk to the treasurer about possible (partial) funding.

If you have information on any other visitors in OR or related areas, please let the editor know.

Situation Wanted

Dr Sabry Shaban, Economics Group, The Islamic Research Foundation, Astan Quds Razavi, P.O. Box 366-91735, Mashad, Iran, has written about the possibility of a position in New Zealand.

Qualifications: Ph. D. in Management Science, Sheffield City Polytechnic.
M. Sc. in Operational Science, University of Sussex
B. A. in Commerce, Baghdad University.

He is looking for a research or teaching position. He is the author of 5 books and a number of articles. His research interests include production line design and behaviour, and simulation. He has taught Operations Research, Production/Operations Management, Management Information Systems, and Statistics. Gary Eng (✍ P.O. Box 930, Wellington, or ☎ (04) 723 550) has his full C.V.

Wellington Branch Meeting

Dick Bullock - OR in Transport

Dick gave us a fascinating *pot-pourri* of OR experiences and distilled wisdom at the Wellington Branch meeting on Tuesday, 3 April 1990. Dick regaled us with stories of his experiences of OR consulting.

- About a catapult for hurling thawed frozen chickens at an aircraft windscreen, to show the pilots that they would be safe from bird strike. **Sell the solution.**

- About colliery planning with geology scenarios being played out with all involved. **Successful OR gets people talking to each other.**

- About an experiment on petrol additives with errors of measurement an order of magnitude bigger than the effect to be observed. **If you're going to analyse any data, you have to either collect the data yourself, or at least have seen the data being collected.** And, **Never let an engineer plan an experiment.** *(Never let an engineer plan anything. - Ed)*

- About a large dynamic programming model to determine the location and timing for a new airport. **A Model provides a framework for collecting data. It doesn't let you forget things.** The base year for the discounted cash flow was 1992, but everyone thought it was a decade earlier. This allowed the reported net present value to be out by $500 million. In any event, the politicians took up the analysis and decided on a location in a marginal electorate. **The more you analyse, the worse the decision. Involve decision makers as much as you can.**

- About a camel in Australia that turned from a cow into a horse when changing railway lines. **Never trust third parties for data.**

- About the Patagonian Express, the railway line that exists solely to support itself, but was justified on the basis of 'defence'. **Defence is the last resort of economic scandal.**

Some gems of wisdom from an OR consultant: **Define the real problem first. A sub-optimal technique on a spreadsheet may be more understandable, and hence more likely to be implemented, than an optimal textbook solution. In reports, colour and movement are important; in thin reports - essential. In any OR study one third of the time should be spent on the definition of the problem, one third on the solution, and one third on the selling the solution back to the customer.**

During the dinner afterwards at the Jasmin, we discussed the greenhouse effect of ruminant animals converting vegetation into methane. With a process of assumption, wild guess, school chemistry, red wine and table napkin mathematics, it is probably quite misleading to report that New Zealand sheep produce the same greenhouse effect as burning 50,000 tonnes of coal a year. The rumour that Dick had to be physically restrained from standing on the table and singing Spike Milligan's "Ying Tong" song, with actions, is, of course, wildly untrue. But it is true that we all very much enjoyed Dick's company.

Dick is currently a Director of Travers Morgan,
Planning and Management Consultants,
✍ 499 St Kilda Rd., Melbourne, Victoria 3004, Australia.
☎ 00 61 3 820 4200, Fax 00 61 3 820 4598.
Dick has been in Wellington working for New Zealand Railways.

Matthew Civil

Library Journals

The following publications from the ORSNZ library are surplus to requirements and are available to whoever wants them. They may be inspected in the AMD library, 7th floor, Rankine Brown Building, Victoria University of Wellington. They can be collected in person only; please do *not* send in requests to council members nor to the AMD librarian.

- *Ecoforum* 1985-86
- *Future Times* 1982- (NZ Futures Trust)
- *Interface* 1981- (NZ Computer Society)
- *International Abstracts of Operations Research* 1972-78, 1982, 1985 (duplicates)
- *Investigacion Operacional* (Cuba) (duplicates)
- *Journal of the Operational Research Society* 1981 (UK) (duplicates)
- *NZ Maths Society Newsletter*
- *Q NewZ* and *Quality Assurance* 1984- (NZOQA)

The ORSNZ library holds the following publications (not all series are complete):

- *Boletim Técnico da Petrobrás* 1969- (Brazil).
- *Economic Computation and Economic Cybernetics Studies and Research* 1974- (Romania)
- *Interfaces* 1974-79 (USA)
- *International Abstracts of Operations Research* 1972-78, 1982, 1985.
- *Investigação Operacional* 1981- (Portugal)
- *Investigacion Operacional* 1973-84 (Cuba)
- *Operations Research Quarterly* then *Journal of the Operational Research Society* 1974- (UK)
- *Journal of the Operational Research Society of Japan.* 1974-
- *New Zealand Population Review* 1978-
- *Proceedings of the Royal Society of New Zealand* 1972-87
- *Search* 1978-80 (ANZAAS)
- Newsletters of ORS (UK), IFORS, and APORS
- Sample copies of a variety of journals
- University of Lancaster publications
- Miscellaneous papers including papers submitted for past student paper prizes
- Various conference proceedings.

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