



NEWSLETTER

Operational Research Society of New Zealand (Inc.)

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SEPTEMBER 1988

EDITORIAL

This issue is inundated with branch meeting write ups from Wellington for which I am very grateful. They all arrived in the last few weeks and whilst I do not wish to sound ungrateful it would be nice to get them as meetings progress. To some extent I will take the blame since I have not published a deadline for news received. This has proved difficult in the past since material does not flow smoothly, but next year I will endeavour to work to a four issue a year newsletter to encourage a smooth flow.

My suggestions are

Issue	Deadline
April (start of University year)	20th March
August	20th July (pre-conference)
October	20th September (post-conference)
December	20th November (end of year)

What does anybody else think?

I intend using MacWrite to edit the newsletter so electronic files are welcome either by MacDisk or on the FAX to my address

PSI*460000001::SRMXDW

Dave Whitaker, AMD,MARC,
Private Bag, AUCKLAND

FOR SALE

Watch this space!

APPOINTMENTS

Vacation work for students?
Staff Vacancies?

FORTHCOMING CONFERENCES

Please let us know

Any

other

ideas?

WELLINGTON BRANCH MEETINGS

Wellington Branch of the OR Society held a meeting on Tuesday 22 March 1988 at 5.30 pm. The meeting was well attended with between 20-30 members turning up.

A talk was given by Dr Bruce Murtagh from the University of New South Wales on "Industrial Applications of Mathematical Programming".

Dr Murtagh spoke for approximately 1 hour giving a very good anecdotal and reasonable technical description of Mathematical Programming used by some Australian companies.

The talk was carried out in an informal atmosphere with occasional questions asked by the audience.

Bruce Murtagh started the talk by discussing OR in general, moved on to the problems of Large Scale Optimisation, and means of exploiting Optimisation structures. A brief mention was made of Equilibrium relationships and sparsity.

Next, a Systems approach was discussed and how large systems are usually made up of small sub systems. Time Staged Models were discussed with observations on staircase structure and Decomposition.

Distinctions were made between linear programming and nonlinear programming problems.

Dr Murtagh then gave several first hand examples of Australian companies using OR techniques, examples included the Power industry and the use of load management, and a Petrochemical plant trying to reduce costs of feedstock.

Nonlinear Integer Design Problems were discussed with an example given from experiences with a gas Distribution problem. Another illustration was in the production and distribution of Beer for Alan Bonds where there were several breweries capable of producing the same beers, but the breweries were in different locations.

A discussion followed on the Quadratic Assignment problem and Facilities Location problem, questions centred around the use of PC, Management's increased awareness of the uses of Computer, and Implementation problems.

Dr Murtagh made the comment that implementation was becoming easier with Management's increased use and awareness of the Computer as a business tool.

It was a very worthwhile talk which generated a substantial amount of interest from the audience.

The Impact of State Restructuring on OR and Planning

This was the topic of the June Wellington Branch Meeting. Had the title been the other way round, viz. 'The Impact of OR and Planning on State Restructuring', the session would have no doubt been a lot shorter! As it was, a panel of speakers presented their views on how restructuring had affected their OR and planning functions. The panel consisted of representatives from the Wellington MED, DSIR's Applied Maths Divn and Railways Corporation. Interestingly, all speakers had found that the benefits accruing far outweighed any costs incurred (of course THEY were all still employed), and that emphasis is now on shorter term pathways rather than long term planning.

John Boshier, now Deputy General Manager of Wellington MED, formerly New Ventures Manager at Coal Corporation, and previously director of Energy Planning at the Ministry of Energy, spoke first. He commented that OR tools are now being used in the regional offices of State Owned Enterprises with the move to decentralised planning. Emphasis is on short-term planning with a high use of consultants, although not necessarily in the analytical planning areas. A closer rein is being kept on information because of its likely commercial value. Some major public policy issues are still unresolved, such as resource management. A much more robust approach to business planning has been taken, in that a strategic planning approach is now used, rather than the previous one of deterministic planning.

Robert Davies, the director of DSIR's Applied Maths Divn, said he wouldn't like to go back 5 years, but also isn't sure about the next 5. He really appreciates the greater control that restructuring has given to DSIR, some of which has in turn been passed on to the divisions. As an example, AMD can allow a much more reasonable allocation to overseas travel (but the recruiting slogan is not quite yet "Join AMD and see the world"!).

Research 'for the Crown' has to be carefully thought out with definite results in mind - the serendipity associated with discoveries in long-term research is under threat. The negative side of having more control is having to be more accountable, and more reporting is required from scientists and the division as a whole. The business tools used by other consulting groups are not currently available at DSIR which makes such tasks more cumbersome.

Murray King, Corporate Manager, Planning, at Railways Corporation, pointed out that deregulation of the freight industry has had a much greater impact on Railways than Corporatisation. In three years they have survived a 42% decrease in revenue (in real terms). Their output has remained the same during this period of staff cut backs, so a massive increase in productivity has already been achieved (60+%). The role of the 6 people in the planning division includes coordinating the plans of the individual business groups. These groups now use OR consultants, and planning has become a mainstream activity rather than a parallel activity.

A lively discussion followed with the speakers clarifying that in all their work places, planning has now been decentralised. The job of each head office is now more to coordinate the various outputs from either the regions, divisions or business groups, than to send out specific plans for them to follow. Similarly, likely areas for OR analysis now appear to be with these groups rather than with the head office. Seems like we can now go and live out in the wops (or even the South Island) and get OR consultancy jobs with the local branches of the SOEs!

Karen Garner

The Recent Rise in Pill-Popping Expenditure

A talk given by Dr Frances Sutton

Wellington Branch Meeting 19 July 1988

The Wellington Branch Meetings this year have been notable for their topicality. The subject matter for Frances' talk was no exception, having been the main item of a recent "Frontline" television programme. Her work had focussed on the Pharmaceutical Benefits Scheme which, briefly, is the cost that patients don't pay for their prescriptions. Over the period 1977 to 1983 the PBS expenditure remained fairly constant in real dollar terms but from 1984 onwards there has been a sharp increase. Expenditure is currently running at half a billion dollars - that's \$150 per person for every New Zealander.

Analysis of expenditure between the two periods centred on three major components: price, volume and mix. Using weighted indices for each of these factors, it appears that price contributed less than 1 percentage point of the average annual expenditure increase of 14% over the later period, while the other two factors accounted almost equally for the remainder. Volume could be split into components relating to population size, prescriptions per age-adjusted head and prescription size. For example, elderly people use an average of 20 prescription items per year, considerably more than other age groups. The mix of medicines examined the entry effect of expensive new medicines, the exit effect of superseded drugs and the changing proportions of prescribed drugs which were common to both periods.

International comparisons revealed some interesting factors. The USA has felt a similar increase in prescription costs, whereas in Australia cost increases had been held down. A possible reason for this disparity is the negotiating stance of the respective authorities in what is a highly regulated market. Another factor is differing prescription size policy, NZ's method being based on time periods whilst Australia's is a standard pack size.

Major policy decisions and qualitative factors were brought out in a lively discussion which followed the talk. For example, the effect of the dollar prescription charge and rises in doctor's fees resulting in larger prescription sizes. Here, perhaps, medical practitioners are experiencing pressure from their patients countering pressure from health authorities to prescribe in smaller quantities.

Frances summarised her work by looking at the policy implications. These ranged from the need for prices of new and existing products to be restrained to encouraging doctors to become more cost conscious in prescribing. She concluded by emphasising the need to improve the monitoring of information in this area, no mean task when dealing with 30 million prescriptions per year.

John Hayes

Student Papers

Wellington Branch Meeting 24 May 1988

Antarctic Temperature Variation by John Sansom Ranking Station Efficiencies for a Power Generation Model by Mark Pickup

An established feature of the Wellington Branch calendar is the presentation of research projects carried out by students of the Diploma in OR and Statistics at Victoria University. This year's speakers had chosen topics from their work experience, John from climate research with the Meteorological Service and Mark from his work at Electrocorp.

John's study was prompted by the widespread concern about temperature variation globally and its underlying causes, currently being blamed on an increase in carbon dioxide in the atmosphere, popularly known as the 'Greenhouse Effect'. In particular, the idea has been promulgated of temperature changes at the poles reflecting global warming and cooling. The aim of the study was to show, with the aid of statistical analysis, if there had been a significant increasing trend in temperatures over the Antarctic.

There was no shortage of data. In fact, with the 30 years worth of recordings from 16 different weather stations spread over the continent the first problem was choosing a subset of the available information. Four stations were selected as representative of different geographical and climatic areas. Some of us armchair weather forecasters were surprised that the Antarctic should have such a range of weather patterns, even if these were cold, very cold, bitterly cold and weather only suitable for copper-zinc alloy sculptured primates.

Analysing the weather patterns by splitting the data into trend, seasonal and irregular components revealed that there was little statistical evidence of increasing temperatures. The link with the 'Greenhouse Effect' could not be proven, nor could global temperature rises be statistically related to Antarctic effects.

Mark's project was part of Electrocorp's long-term strategic development work. His task was to determine a method for ranking the nation's thermal power stations, given their varying fuel requirements, for input into a 30 year simulation model of national power generation.

Preliminary analysis of the fuel sources (eg Maui gas, Huntly coal, Marden Pt distillate, etc) and the fuel consumers (eg Stratford, Marden B, New Plymouth, etc) revealed a large number of potential combinations. By setting the problem up as a capacitated decision network, Mark was able to diagrammatically describe an apparently complex problem in an easy to understand manner. Using a 'stages-and-states' type analysis he demonstrated the use of marginal costings to simplify the calculation routines in developing a minimum cost path. Writing software to incorporate his methodology into the overall

simulation model highlighted the problems of avoiding cycling iterations and negative flows through the network.

Both speakers succeeded in making their subject matter understandable and providing a clear analysis of two topical issues.

John Hayes

The CALL FOR PAPERS/FIRST ANNOUNCEMENT for

IFORS '90

12th Triennial Conference on Operations Research

12ème Conférence Triennale de Recherche Opérationnelle

June/Juin 25-29, 1990
Athens - Greece

will be sent out to all Member Societies (all readers of the IFORS Bulletin will automatically receive a copy from me) this coming fall.

The theme of the Conference is:

OR: WISDOM FOR PROBLEMS OF TODAY



14th IFIP Conference on

**SYSTEM MODELLING
AND OPTIMIZATION**

Leipzig, GDR, July 3-7, 1989

cosponsored by IFORS - our Representative on the International Program Committee is:

Professor, Dr. Heiner Müller-Merbach
University of Kaiserslautern
P.O.Box 3049, D-6750 Kaiserslautern

FIRST ANNOUNCEMENT

TIMS XXIX - Osaka '89

July 23-26, 1989

Managing Productivity and Quality in the 1990's
Future Developments in the Management Sciences

System Dynamics

by Bob Cavana

Wellington Branch Meeting 9 August 1987

Bob Cavana's became involved with System Dynamics (SD) when researching his PhD at Bradford Management Centre (BMC) on a policy analysis of the NZ forestry plantation system. BMC had produced their own SD computer package for which Bob co-wrote the user manual. Since returning to Wellington he has moved from Forestry to Railways Corporation but still maintains his involvement in the subject through an SD model for the NZ Planning Council.

Bob began with a potted history of the development of SD : the early work of Jay Forrester at MIT; it's populist phase with the publishing of "Limits To Growth"; up to the present day SD micro packages. What was once a tool that appeared to be exclusive to major corporations, governments and international 'think-tanks' can now be purchased for the humble PC. While the tools have become more accessible, the philosophy has remained the same. Although SD is often seen as an alternative forecasting method Bob emphasised that its role is primarily one of helping managers to better understand and, hence, improve the systems they manage.

The Planning Council sponsored Bob's recent attendance at the International System Dynamics Conference at San Diego, which lived up to its name by attracting 75 overseas attendees. The style of the conference reflected the stimulating nature of some of the popular SD literature. Apart from plenary sessions given by invited speakers, papers were restricted to 12 minutes in the main forum but provision was made for speakers to continue a less formal dialogue with interested parties. The range of topics varied from the highly topical ("Aids in the UK") to the more esoteric ("Bifurcation sequence in a model of migratory dynamics"). Some of the titles below might strike a chord with NZ managers coping with a changing environment:

- Systems behaviour of educational problems
- Simulations for the management of a commercial bank
- Capital investment planning for new technologies
- Financial and production planning in a manufacturing firm

While the early software required complex mathematical models to be programmed, the state-of-the-art software enables users to draw their system and converts the picture into a mathematical model. With such software it is easy to draw parallels between the surging popularity of spreadsheets in the early 1980's and the potential use of SD software in the late 80's.

The benefits from the SD approach, though, remain the same: that of providing an overview for a better understanding of systems and scope for improved management.

John Hayes

There is a new journal in this field entitled "System Dynamics: an International Journal of Policy Modelling". Bob Cavana is on the editorial board and can answer any enquiries about subscriptions or submission of articles. He can also provide copies of the list of papers at the conference.

CONFERENCE 88

This year's O.R. conference was held at Auckland University. About 60 people attended with approximately 50% from Universities, 25% from Government Departments and 25% from the private sector. This split was not reflected in the papers given however, with 20 coming from Universities, three from Government Departments and only one from the private sector. These figures reflect the sad trend of previous years where presentations from industry are scarce. On a brighter note, the conference attracted six overseas speakers.

As the conference progressed, a few "catch-phrases" emerged. One of these was "so I put it through MINOS" and nobody's paper was quite complete without somehow mentioning this - even if it was irrelevant! I guess this expression was inevitable as both Michael Saunders and Bruce Murtagh (co-authors of MINOS) were present.

The keynote speaker was, in fact, Michael Saunders from Stanford University. His keynote addresses were given with a subtle sense of humour that helped to make them one of the highlights of the conference. His first talk was on applications of MINOS and GAMS, but it was his second talk on Interior Point Methods that was particularly interesting. He showed that Karmarkar's "new" algorithm is just a special case of Newton's method for linearly constrained optimisation, and concluded that the Simplex Method will remain in use for most existing applications of mathematical programming. However, the future for this new method remains bright.

Another of the highlights of the conference were the student papers which were very well presented. The paper on Matching Algorithms by this year's student prize winner, Andrew Mason, was particularly good. His wit and use of simple examples made the talk enjoyable and understandable for all. Perhaps this style of presentation should be adopted more widely.

David Ryan's presentation on Air Crew Rostering is another paper that sticks in my mind. Even though I have heard many talks given by David on this subject, I am continually amazed by the size of problem he is able to solve optimally. This is an excellent example of a practical application of mathematical programming.

Tony Vignaux's paper on Dimensional Analysis created a lot of interest and controversy. This is a topic which I am sure many people would like to question Tony on in more detail.

The papers outlined above are only a sample (biased at that!) of those given at this year's conference. There were, however, many other interesting and worthwhile papers on a broad range of topics including production and inventory control, decision analysis and non-linear programming.

Congratulations and thanks must go to Julie Faulkner and Andy Philpott for organising such a successful conference.

Sue Cannell