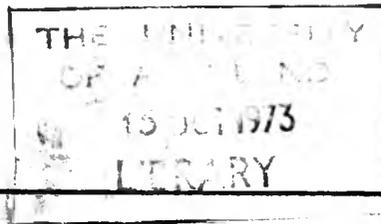




# NEWSLETTER

*Operational Research Society of New Zealand (Inc.)*

OCTOBER 1973



VOL. 10. NO. 1.

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## COUNCIL NOTES

From the meeting of August 21, 1973:

1. It was agreed to put a Constitutional amendment, providing for postal voting on such amendments, to a Special Meeting of the Society.
2. It was agreed to hold the above Special Meeting and the Annual General Meeting in conjunction with the Conference (Wellington, October 26, 1973).
3. The following Sub-Committee appointments were made:

<u>Education</u>	:	Dr. Schroder, Mr Walker (Wellington)
<u>National Events</u>	:	Mr Cook (Wellington), Professor Vignaux (Council) as Convener (subject to his acceptance)
<u>Public Issues &amp; Awareness</u>	:	Mr Jelacich (Wellington)
<u>Publications</u>	:	Dr. Murtagh (Wellington)
<u>Membership</u>	:	Miss Watson (Wellington), Mr Elder (Auckland)
4. Proposed policy and procedures relating to N.Z.O.R., prepared by the Publications Sub-Committee, were adopted.
5. The Treasurer's report indicated that the Society's finances were in a healthy state.
6. Mr Bearsley's resignation from Council and as Convener of the National Events Sub-Committee was accepted with regret. He has been transferred to Melbourne.
7. It was agreed that the survey of courses should be undertaken every second year.

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## BRANCH NOTES

### WELLINGTON

1. At the July meeting of the Wellington Branch Dr. C.S. Withers of the Applied Maths Division, D.S.I.R., described a study he had carried out while at the University of California.

The study used step-wise multiple regression analysis to identify those factors which could best determine the successful performance of dental students. The results were used by the University Admissions Committee in formulating a new policy for the selection of students.

Sixteen success criteria - average grades and grade point averages in various parts of the course - were used along with 29 predictors, including various aspects of the students' previous academic records and their performances in a series of tests. 173 students graduating during the period 1968 - 1970 were included in the study.

To obtain an overall success criterion a screening chart score - a linear combination of predictors - was at first used. As a later development, individual success criteria were weighted by members of the Admissions Committee according to the importance of the criteria. The analysis requires that data be updated year by year and opens the way for further experimentation and research.

2. On September 30 the Branch met in the Ante Room of the Grand Hotel. Our usual meeting place, Wakefield House, recently had an attack of the bulldozers, and it was with thankful regrets that some of our more indulgent members turned toward the new venue.

The speaker for the evening was Mr Ed Johnson, a Consultant with McKinsey Co., who spoke on O.R. in capital investment analysis. Ed discussed a project he headed which assessed the impact of investment in overhead irrigation on the largest sugar plantation in the world, situated in Hawaii.

The discussion was broken into 3 areas:

- (a) The analytical requirements of the project;
- (b) The study group's approach, and
- (c) A review of the highlights of their findings.

The main feature of the analytical requirements was the objective function. This function related the adequacy of the water supply for a particular field to the tons of cane per acre produced and hence to the \$ yield. The relationship between water supply and yield was curved due to diminishing returns and therefore had to be broken into linear segments so that L.P. could be used.

The study group's approach was a 6 step process incorporating:

- (a) Segmenting the plantation into homogeneous blocks and new land blocks which could be developed;
- (b) Collecting data by block;
- (c) Estimating common costs;
- (d) Selecting the best first step for conversion from the old to the new irrigation method;
- (e) Repeating the selection, checking the marginal rate of return on investment;
- (f) Attempting to refine the final solution.

Two major computer models were used:

- (a) An agricultural investment model - a fairly standard investment model;

- (b) A water allocation model - a mixed integral linear program with the objective function mentioned above. The integral part of the model was used to decide which blocks to bring into the irrigation system next, or which new blocks to develop.

A review of the highlights of the project indicated that even at a high after tax R.O.I. of 15%, conversion of land to the new irrigation scheme would take 6 years. Therefore little work was required to be done on the sensitivity on changing inputs to the final results as earlier tests had indicated only  $\frac{1}{2}\%$  difference between results simulated by the model and actual results experienced.

Interesting aspects of the discussion included the many different O.R. techniques actually used in this capital investment project, and the efficient use of slides which had previously been used to help sell the project.

The evening closed with a lively discussion and liquid refreshments!

3. September 26 was "Students' Night" in Wellington at which two groups of students from the Information Science Honours course at Victoria University presented papers on O.R. projects they were engaged in.

The projects and students concerned were:

- |   |   |                   |
|---|---|-------------------|
| Assembly Line Balancing                               | - | Miss J. Stretton; |
|   | - | Mr R. Ferguson    |
| Analysis of the Casualty Dept.<br>of a Local Hospital | - | Mr B. Cron;       |
|   |   | Mr C.F. Looi      |

The assembly line balancing project concerned a car assembly line with the added complication that a number of different models were being built concurrently on the same line. Each model had a similar sequence of building operations, but times to perform the operations varied widely.

A heuristic method of optimising sections to meet the overall criteria has been attempted. The sections are respectively:

- (a) Sequencing of operations and dovetailing of operations for different models and then assigning them to stations.
- (b) Sequencing of model types in the best order down the line.
- (c) Assigning men to stations or areas to perform specified tasks.

The second project covered aspects of the Casualty Department, Hutt Hospital, which the Chief Medical Superintendent and Records Officer were interested in.

The first task was to carry out simple data analysis on two sets of data collected; the first set being the numbers of traffic, assault, poison, and total cases from the period 10 July 1972 to 8 July 1973 and the second being an analysis of 1,200 patients taken over a period of two weeks in March 1973.

The second and main task of the project was to forecast future demands on the Casualty Department. Of the several statistical techniques tried for the forecast, it was found that a trend projection method over the last 4 years seemed to give the best result.

Using the mentioned method, the costs for 1973, 1974 and 1975 were 31,840, 33,500 and 35,320 respectively. These figures will be used in the planning of the new Casualty Department which is to be built.

#### AUCKLAND

The meeting held on September 20 featured Mr Peter Dickson, a lecturer in Management Studies at Waikato University, who spoke on "Advertising Research and Operations Research".

Advertising Research in New Zealand, according to the speaker, was minimal. It has only been touched on by a handful of persons, mainly those doing research for advanced degrees.

When it is considered that advertising agencies have done an excellent job selling advertising to a host of large companies who are mainly unaware of the impact or benefits their advertising is gaining them, it may be assumed (correctly or not) that they think that if they stop or decrease advertising expenditure their competitors will run away with the market. This may infer that someone has not done his basic research. Take, for instance, Mr Dickson's opening quote:

"I know that at least half of my advertising is wasted. The trouble is I don't know which half".

This, in his opinion, although a remark coined from the 50's and 60's, still expresses the sad reflection of the state of Advertising Research.

Add to this the fact that advertising, especially on T.V., has to support the maintenance of the national system, making it a compulsory evil, and it is little wonder advertising agencies are climbing onto the bandwagon of an 80 million dollar handout.

Mr Dickson is an advocate of setting up or subsidising research projects to study the social implications, as well as optimising short and long term returns (supposedly monetary wise). This could be done by Government, University Research Grant, or by Industry seeking maximum value to themselves on advertising budgets.

Models derived by Operational Researchers do exist and even with the structural limitations these models contain, they are still more than sufficient to supply an advertising strategy. The missing dimension, contends the speaker, is "basic Advertising Research : laboratory research, attitude surveys and ex post facto analysis to provide the many answers before practitioners can remove the remaining but vital intuitive assumptions".

The address was well presented and gladly accepted by the audience. The evening concluded with coffee.

ADDITIONAL COUNCIL NOTES

From the Council meeting of 26 September:

1. The President will be attending the 1973 U.K.O.R. Conference and Council appointed him as O.R.S. New Zealand's official delegate. Council authorised Professor Jackson (who will be paying his own Conference fees and expenses), to spend up to \$100 on expenses in pursuit of O.R.S.N.Z. business.
2. Professor Vignaux reported on his contacts with the Australian Society for Operations Research, made while attending their Conference. A.S.O.R. is very interested in co-operating with O.R.S.N.Z. and has appointed one of its members to continue discussions. Council asked Professor Vignaux to act on O.R.S. New Zealand's behalf.
3. Mr Scott is shortly to attend the Conference of the Airline Group of the International Federation of Operational Research Societies.

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COMPLAINT

We have recently received a justifiable complaint from one of our fraternity who had a paper (on which he based a talk to one of the Branches), given to the new editor of N.Z.O.R. without the author's permission.

The person who supplied the paper undoubtedly meant well and we badly need journal material - but please obtain the writer's permission else it can make our end rather awkward.

- Ed.

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EDITORSHIP OF N.Z.O.R. JOURNAL

In its meeting of March 20, Council offered the editorship of "New Zealand Operational Research" to Dr H.G. Daellenbach, Reader in Economics at the University of Canterbury and in charge of the O.R. courses offered by the Economics Department there. Dr Daellenbach accepted this position.

At the same meeting, Council also requested that the Publications Sub-Committee, in conjunction with the new editor, work out an editorial policy suitable for New Zealand conditions. Such an editorial policy, as well as guidelines for contributors, have now been approved by Council.

The following points were kept in mind while working out the editorial policy:

No attempt should be made to compete with such journals as "Management Science", "Operations Research" and others of similar calibre with their almost exclusive emphasis on theory. Rather, "New Zealand Operational Research" should attempt to be of relevance to operations researchers and managers in this part of the globe, particularly New Zealand. The emphasis of the journal will therefore be towards actual or potential applications of O.R. in New Zealand, although the odd theoretical papers will not be excluded. Even if we do not attempt to compete with the top journals in the field, the editor will try to achieve and maintain certain minimal standards as to contents and presentation, such that "New Zealand Operational Research" will be able to command respect from O.R. practitioners in Australasia, not in terms of theoretical excellence, but in practical relevance.

The editor realises that "New Zealand Operational Research" can only be successful if suitable manuscripts are received in sufficient number. For two issues a year this means at least 10 to 12 manuscripts. The editor therefore calls on all members of the Society to submit manuscripts on Operations Research problems and applications - past, present or hopefuls, successful as well as unsuccessful (the latter may help others prevent similar mistakes). The main emphasis of manuscripts dealing with applications should be on methodology rather than on numerical results.

As one of the features of the journal, the editor plans to have in each issue a survey article on some O.R. tool, class of models, or area of application which is of particular relevance to Australasia or which due to relative newness, is not yet sufficiently known in this part of the globe. Examples of this sort might be "O.R. in marketing", "O.R. in agriculture", "Survey of potential applications of goal programming", etc.

Anybody who feels that he can contribute an article of this sort is urged to contact Dr Daellenbach.

All manuscripts should be sent in duplicate to:

Dr H.G. Daellenbach,  
Economics Department,  
University of Canterbury,  
Private Bag,  
Christchurch 1,  
NEW ZEALAND.

EDITORIAL POLICY

The main orientation of "New Zealand Operational Research" is towards applied work in O.R. and quantitative decision making, although relevant work of a theoretical nature will not be excluded.

Priority will be given to papers covering:

1. Either examples of practical O.R. applications which have been implemented or are in the process of being implemented, or examples of studies for potential O.R. application which are of interest to the New Zealand scene. The emphasis of such articles should be on methodology, with a clear exposition of the model used, the assumptions made and the extent to which the results are used.
2. Examples of practical implementation of known models showing actual steps undertaken to ensure successful implementation, discussing problems encountered and how they were resolved.
3. State-of-the-art surveys that report with main emphasis on the potential use of particular facets of O.R. techniques, including bibliography.
4. Reviews of the state of development of fields of knowledge relevant to O.R.
5. Book reviews of texts in O.R. and related fields published in Australasia.

Books, pamphlets and periodicals for review should be sent to the editor.

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INSTRUCTIONS TO AUTHORS OF JOURNAL MANUSCRIPTS

"New Zealand Operational Research" welcomes unsolicited manuscripts not published or accepted for publication elsewhere. All articles will be promptly refereed by one or more referees and the author(s) will be supplied with a copy of their reviews if an article is rejected.

Manuscripts should be typewritten double-spaced, including tables, footnotes and references or bibliography. Footnotes should be used sparingly, if at all, and should be shown at the end of the article numbered consecutively. All references are to be listed alphabetically by the author at the end of the manuscript and numbered consecutively. Reference callouts in the body of the text should be indicated by bracketed numbers,

e.g. [4] or [4, p. 239].

Each manuscript should be preceded by an abstract of 100 to 200 words and the text organised into sections numbered consecutively. Manuscripts should, as a rule, not exceed 20 typewritten pages.

O.R. COURSES

The Department of Information Science at Victoria University has just released its 1974 Prospectus. Copies are available from:

The Secretary,  
Department of Information Science,  
Victoria University,  
Private Bag,  
WELLINGTON.

The following courses will be offered in 1974:

Info 201

An introduction to computers and programming (chiefly algol).

Info 301

An introductory course in Operations Research techniques. Topics covered are:

Linear Programming: simplex method, duality.  
Networks, Dynamic Programming: methods and applications.  
Investment analysis.  
Integer programming: methods and applications.  
Non-linear programming methods.  
Uncertainty and risk in O.R.  
Forecasting, stock control.  
Queuing theory.

Info 302

Data Structures:

"By familiarising the student with the basic structure and language of computers, this course will give him a better understanding of their internal behaviour".

Information Science for B.Sc.(Hons.), B.C.A.(Hons.), B.A.(Hons.)

An Honours course consisting of 4 papers from:

Operations Research applications.  
Operations Research techniques.  
Optimisation theory.  
Simulation.  
A Special Topic.  
Computer Applications.  
Data Structures.  
Translator Writing Theory.  
Computer Structures.  
Phil. 407 : Recursive Function Theory.  
Accy. 403 : Advanced Management Information Systems.

Information Science for M.A., M.C.A., M.Sc.

By thesis.

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O.R.S. CONFERENCE (U.K.)

TORBAY - 13-16 NOVEMBER 1973

Enquiries: Operational Research Society,  
Neville House,  
Waterloo Street,  
Birmingham, B2 5PY,  
ENGLAND.

(Our President will be attending)

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PUBLICATIONS:

Journals Received

The Society receives journals on OR from other organisations from time to time. These are housed in the Applied Mathematics Division, D.S.I.R. library, Victoria University, and are available to members on request.

Latest arrival is:

"AGIFORS proceedings XII" - Proceedings of the 12th airline group of IFORS Symposium - 1972 - Israel.

Additional copies are available from:

The Publications Officer,  
Operations Research Section,  
American Airlines,  
633 Third Avenue,  
New York, N.Y. 10017,  
U.S.A.

Simula Users Journal

We have also received copies of "Simula", the new quarterly journal for Simula simulation language users. For those thinking of using Simula, the first year's issue of this journal is available free from:

Norwegian Computing Centre,  
Forskingsveien 1B,  
Oslo 3,  
NORWAY.



*Operational Research Society of New Zealand (Inc.)*

TENTH ANNUAL REPORT

FOR THE YEAR 1972 OCTOBER 1 TO 1973 SEPTEMBER 30

Last year in his annual report our President commented on the growing maturity of our society. It is no longer true that the strength of the society is mainly in a single branch, for there are now three vigorous branches each contributing to the society in a distinctive and unique way. With this change there has come an increasing involvement of the branches in discussion of society policy, and a desire of their members to be more involved in determining what the society will be like.

At the special general meeting immediately preceding the annual meeting, members will be invited to take a significant step towards involving all members in the major decisions of the society. It is a step which is symbolic of the change from a small group of practitioners and other interested persons, to a group of professionals spread widely in our society, who seek a common means of furthering a set of shared values about the ways in which many of the pressing problems of the community may and should be approached.

The remainder of this report is based on the reports of the various Council subcommittees and of the branch committees.

Membership: After the large increases of the last two years which have been associated with the firm establishment of the branches, membership growth this year has been less rapid. Membership as at 8 September 1973 totalled 267 : 1 Honorary member, 41 Full members, 183 Associate members, 41 Student members and 1 Collective member. They were divided amongst the branches as follows : (last year's figures in brackets) Auckland 69 (66), Wellington 130 (117), Canterbury 51 (52), Unattached 17 (14).

Finance: The Society's finances are in a satisfactory position, requiring no increase in subscriptions.

International: The recent visit to the Australian O.R. Conference by Professor Vignaux has resulted in steps towards formal co-operation between our Society and the Australian Society for Operations Research.

Education: The major achievement this year has been the completion of the first survey of O.R. and related courses offered in New Zealand. The survey succeeded in providing detailed quantitative information on the current O.R. educational scene. A pleasing response showed 65 courses being offered. Most O.R. type courses are part of other professional training in business, engineering or economics.

Public Issues and Awareness: Members have not raised issues for the involvement of the Society. A list of those members prepared to do O.R. consulting is being prepared and a directory planned for publication by the Productivity Centre will refer to the Society and O.R. in its list of productivity improvement aids.

Publications: Five issues of the Newsletter and one number of 'N.Z. Operational Research' were published during the year. The most significant event in the publications field this year was the appointment of Dr Hans Daellenbach (Canterbury) as new editor (after 1, 2) of 'N.Z.O.R.'. Previously the Convener of the Publications Subcommittee has been the editor of both the Newsletter and 'N.Z.O.R.'. The creation of the independent position will result in a spreading of the work-load and a steadier flow of our publications than there has been in

the past.

Questionnaire: The format of the questionnaire addressed to members has been finalised after several modifications and is expected to be distributed shortly.

Council: Six Council meetings have been held since the last A.G.M.

Auckland Branch: In retrospect, the second full year of the Society's Auckland operation has been one of quiet consolidation rather than tremendous growth. Talks given at meetings would be classed more as inspirational than technical : this has been partly intentional as it is difficult to interest a widely varied membership in a specifically technical topic.

Canterbury Branch: A program of interesting meetings has been held, but the membership drive has been a hard struggle particularly outside the University.

Wellington Branch: Wellington activities have continued steadily, facing the usual difficulties of obtaining speakers. It is apparent that organisations are increasingly becoming conscious that information of the kind provided by o.r. is a form of wealth and the gaining of such information represents a significant investment. This realisation appears to be producing a certain reluctance to allow the communication of this information by means of papers to Society meetings. The Branch has deliberately not sought prepared scripts because of the inhibiting effect this has in the light of the situation described and because of the extra work involved for a potential speaker. The situation emphasises the value of the informal contacts gained through membership of the Society; perhaps this points to an area for increased activity.

Acknowledgements: I should like to thank all those who have contributed to the operations and growth of the Society during the year.

L. F. Jackson  
President

## APPENDIX TO THE TENTH ANNUAL REPORT

### COUNCIL

President:	Prof. L. F. Jackson
Vice-President:	Mr D. C. Cook (Wellington Chairman)
Hon. Sec:	B. K. Campbell
Hon. Treas:	Mr A. H. Milkop
Council Members:	Dr H. Barr
	Dr H. G. Daellenbach (Canterbury Chairman, co-opted)
	Mr W. P. Foster
	Mr L. E. O'Brien
	Mr M. S. Rosser (Auckland Chairman, co-opted)
	Mr J. L. Scott
	Professor G. A. Vignaux (Immed. Past-Pres., co-opted)
	Mr P. D. Bearsley *
	Mr G. E. Dickinson*
Hon. Auditor:	Mr P. D. Hasselberg

\* Indicates no longer serving in that capacity at 1973 September 30

## COUNCIL SUBCOMMITTEES

### Constitutional

Convener : Professor L. F. Jackson  
Members : Mr D. C. Cook, Dr H. G. Daellenbach, Mr M. S. Rosser,  
Professor G. A. Vignaux

### Education

Convener : Dr H. Barr  
Members : Mr J. A. Jordan, Mr M. S. Rosser, Dr W. R. Schroder,  
Mr J.B.C. Taylor, Mr C. W. Walker

### International Affairs

Convener : Professor L. F. Jackson  
Members : Mr D. C. Cook, Dr H. G. Daellenbach, Mr W. P. Foster,  
Mr M. D. Purdie, Mr J. A. Gibson \*

### Membership

Convener : Mr L. E. O'Brien  
Members : Mr R. J. Elder, Mr T. A. Lusk, Miss K. M. Watson,  
Mr M. G. Dodgson\*, Mr B. F. Ross-Murphy\*

### National Events

Convener : Professor G. A. Vignaux, Mr P. D. Bearsley\*  
Members : Mr D. C. Cook, Mr T. A. Lusk, Mr P. J. McKenzie,  
Mr K. C. Nutsford, Mr I. K. Hampton\*, Professor G. A. Vignaux\*

### Public Issues & Awareness

Convener : Mr W. P. Foster, Mr G. E. Dickinson\*  
Members : Mr M.J.P. Jelacich, Mr A.T.G. McArthur,  
Mr B. R. Slocombe, Dr R. R. Allan\*

### Publications

Convener : Mr J. L. Scott  
Editor, N.Z. Operational Research : Dr H. G. Daellenbach, Mr J. L. Scott\*  
Editor, Newsletter : Mr J. L. Scott  
Members : Mr R. J. Elder, Dr B. A. Murtagh,  
Dr H. G. Daellenbach\*, Mr P. C. Gini\*

## BRANCH COMMITTEES

### Wellington

Chairman : Mr D. C. Cook  
Hon.Sec-Treas.: Mr P. C. Gini  
Members : Mr M.J.P. Jelacich, Dr B. A. Murtagh, Mr C. W. Walker,  
Miss K. M. Watson, Dr R. R. Allan\*, Mr A. H. Milkop\*

### Auckland

Chairman : Mr M. S. Rosser, Mr B. R. Slocombe\*  
Hon.Sec. : Mr R. J. Elder, Mr M. G. Dodgson\*  
Hon.Treas.: Mr K. C. Nutsford, Mr I. K. Hampton\*  
Members : Mr M. D. Purdie, Mr K. Reay, Mr R. Simpson, Mr B. R. Slocombe,  
Mr R. J. Elder\*, Mr J. A. Gibson\*, Mr C. D. Johanson\*

### Canterbury

Chairman : Dr H. G. Daellenbach  
Hon.Sec.-Treas.: Mr J. A. George  
Members : Mr R. A. Clements, Mr T. A. Lusk,  
Mr C. A. Shumway, Mr J.B.C. Taylor

(A new committee consisting of Mr R. A. Clements, Dr H. G. Daellenbach, Mr D. G. Elms, Mr M. L. Gimpl, Mr T. A. Lusk and Mr J. L. Rodgers was elected in September and will decide on office-bearers at its first meeting).

MEETINGS 1972 - 73

SOCIETY SPECIAL MEETING (to amend Constitution) AND 9TH ANNUAL GENERAL MEETING (held in Wellington)

72 Nov 14

AUCKLAND BRANCH

72 Oct 31	(Branch A.G.M.) Dr G. Stewart	'Urban Transportation'
Dec 8	(Dinner meeting) Mr K. Seal	'Indonesia and O.R. Philosophy'
73 Mar 13	Dr G. R. Lindsey	'O.R. and Systems Analysis in the Canadian Dept of National Defence'
May 8	Mr A. MacCormick	'O.R. and the U.S. Academic Scene'
Jun 7	Mr G. List	'An O.R. Approach to Demand Forecasting'
Aug 3	(Dinner meeting) Mr A. Barker	'International Exchange Dealing and What It All Means'
Sep 20	Mr P. Dickson	'Advertising Research and O.R.'

CANTERBURY BRANCH

73 Mar 6	Dr H. G. Daellenbach	'Are Cash Management Optimization Models Worthwhile?'
Apr 10	Dr R. M. Newnham	'Computer Simulation of Forest Harvesting Machines'
Apr 30	(Dinner meeting) Prof. G. A. Vignaux	'O.R. Today and Tomorrow'
Jun 6	(Joint meeting with Christchurch Transport Study Group; Dinner) Mr W. A. Hardman	'O.R. in the Railways Dept'
Jul 17	(Dinner meeting) Prof. W. O. McCarthy Mr A.T.G. McArthur	'Plant Size and Location Studies' 'Dynamic Programming for Dairy Cattle Culling'
Sep	(Branch A.G.M.) Mr F. Stewart Mrs S. Cook Mr R. Proctor	'An Inventory Control Model' 'A Forecasting Model for Food Products' 'A Manufacturing Model'

WELLINGTON BRANCH

72 Oct 4	Mr P. Heylen	'Marketing O.R.'
Nov 14	Mr G. Hollyman	'Practising O.R. in N.Z.'
73 Mar 12	Dr G. Lindsey	'O.R. and Systems Analysis in the Canadian Dept of National Defence'
Apr 10	(Branch A.G.M.) Mr N. Kane	'A Planning Aid for Architects'
Jul 10	(Joint meeting with N.Z. Statistical Assn) Dr C. S. Withers	'A Method of Choosing the Best Students by Regression Techniques'
Aug 30	Mr E. Johnson	'O.R. in Capital Investment Analysis'
Sep 26	Mr B. Cron & Mr Looi C.F.	'An Analysis of the Casualty Dept of a Local Hospital'
	Miss J. Stretton & Mr R. Fergusson	'An Assembly Line Balancing Problem'



*Operational Research Society of New Zealand (Inc.)*

STATEMENT OF RECEIPTS AND PAYMENTS FOR YEAR ENDED 30/9/73

<u>RECEIPTS</u>	<u>72/73</u>		<u>71/72</u>	
Balance at BNZ @ 1/10/72	692.75		500.22	
less cheques not presented	<u>-5.60</u>	687.15	<u>-14.66</u>	485.56
Cash on hand @ 1/10/72		4.52		7.59
Subscription income		852.33		794.50
International Abstracts (63 subs)		226.40		127.50
Rotorua/Bay of Plenty Branch Balance		-		50.31
1972 Conference Surplus		130.00		-
Advertising Receipts		10.00		-
Interest		28.14		15.12
Stratton Dinner		-		27.80
TOTAL RECEIPTS		<u>1938.54</u>		<u>1508.38</u>

Note: subscriptions 72/73 - 208

71/72 - 212

(Auck.48; Wgtn.101; Chch 32; Others 27)

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<u>PAYMENTS</u>	<u>72/73</u>		<u>71/72</u>	
A. Secretarial: Annual Report	42.00		44.00	
Copying	8.95		35.35	
Postage	21.76		16.74	
Addressograph plate charges	-		15.33	
Stationery	21.47		-	
Other	<u>20.47</u>	114.65	<u>16.50</u>	127.92
B. Treasurer: Accounts	9.08		10.48	
Postage	15.25		15.57	
Other	<u>8.30</u>	32.63	<u>7.42</u>	33.47
C. Public Issues:		3.30		15.00
D. Publications: Printing	81.00		57.27	
Postage	42.63		35.53	
Other	<u>22.31</u>	145.94	<u>-</u>	92.80
E. National Events:		23.24		26.18
F. International: Abstracts	223.80		91.72	
Other	<u>9.03</u>	232.83	<u>22.22</u>	113.94



**Operational Research Society of New Zealand (Inc.)**

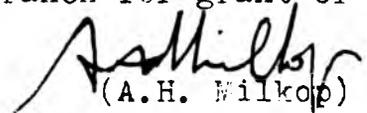
<u>PAYMENTS (contd.)</u>	<u>72/73</u>	<u>71/72</u>
G. Membership: Subscription	50.00	25.00
Addressograph Plate		
Charges	10.17	-
Other	<u>8.91</u>	<u>5.07</u>
	69.08	30.07
H. Presidential: Travel	41.20	-
I. Education:	4.98	5.60
J. Miscellaneous:	5.17	27.50
P. Auckland: Grant	-	103.90
Q. Wellington: Grant	149.00	164.18
R. Christchurch: Grant	86.00	76.15
TOTAL PAYMENTS	<u>908.02</u>	<u>816.71</u>
Cash on hand @ 30/9/73	2.18	4.52
Balance @ BNZ @ 30/9/73	1073.72	692.75
less cheques not presented	<u>-45.38</u>	<u>-5.60</u>
	1028.34	687.15
TOTAL	<u>1938.54</u>	<u>1508.38</u>

Note (1): Outstanding Subscriptions 72/73   \$ 462.00 (\$ 92 owed for previous years)

Note (2): Outstanding liability for Abstracts approximately \$ 75

Note (3): Outstanding liability for 1973 Conference of up to \$ 130

Note (4): Outstanding liability to Auckland Branch for grant of \$ 99

  
(A.H. Wilkop)  
Hon. Treasurer

I hereby certify that I have examined the books and accounts of the Operational Research Society of New Zealand (Inc.). The above statement is in my opinion a true and accurate account of the transactions of the Society.

(being audited at present)