



Dr. G.N.T. Lack, OR Consultant, gives a lecture on the practice of Operations Research. The event was held on October 1, 1988 at the De La Salle University.

## ORSP INDUCTION OF OFFICERS

The Operations Research Society of the Philippines held its annual Induction of Officers in well-attended rites at the Manila Peninsula Hotel on August 9, 1988. Providing glitter to the occasion was the Honorable Secretary of National Defense, Fidel B. Ramos, who was the Guest of Honor that evening.

*see Induction p. 2*

## AUSTRALIAN OR EXPERT GIVES LECTURE

Dr. G.N.T. Lack, international OR consultant from WD Scott, Coopers & Lybrand, Australia, was guest lecturer of the ORSP recently.

The symposium was held last October 1 at the Pablo Nicolas Auditorium of the De La Salle University.

Dr. Lack spoke on three topics:

(1) "Setting Up an OR Department", where he detailed the essential requirements in forming an OR group in a company. He emphasized 6 P's as guidelines: purpose of the group, potential benefits to the company, people it needs, positions to assume in the company setup, projects to undertake, and prospecting for projects. He also discussed the maintenance and

growth of an OR department in the organization.

(2) "OR Application in Developing Countries", was based on his long experience in consulting work for various developing countries including the Philippines. Here he discussed dynamic programming formulations with specific examples in coal mining and road network planning.

(3) "OR Applications in Government", was a description of practical applications in the transportation industry, particularly the location and planning of airport facilities.

Questions and concerns were entertained by Dr. Lack after each topic.

## CHRISTMAS PARTY

The ORSP not-so-old timers already know, and to the probable delight of newcomers, ORSP occasionally holds events free of the seriousness and complexity of the OR field. Yes, we are organizing the much-awaited ORSP Christmas Party to be held on the 13th of December, 7 PM, at the Executive Suite.

Here's why you should come.....

Simply attired as what you think best represents your institution, you automatically win a prize! You wouldn't want to miss the Program and the "Christmas Battle" of the Universities/Corporations, where the most active ORSP supporter will finally be known.

*see Party p. 2*

*Induction from p. 1*

In his welcome remarks, outgoing ORSP President, Bill Torres, cited the mobilization of more than 100 members as the major achievement of the society's initial year. He lauded these members as the cream of their respective organizations who had the potential to contribute a great deal toward a brighter future for our country.

Newly-inducted ORSP President, Elise A. del Rosario, spoke of the Board's plan for the coming year and appealed to committed members to help make the dream come true. Among these plans are the publication of a technical journal and the hosting of regional and international conferences.

Opening his speech with some good natured ribbing, Secretary Ramos described Operations Research as "Applied Common Sense." He then drew parallels between OR techniques and the formulation of the government's anti-insurgency campaign strategy.

All in all, it was an affair that augurs well for the OR Society, a further step towards real cooperation among the disciples of OR in the Philippines.

*Party from p. 1*

The carefully prepared Christmas meal and more free gifts await us all in the remarkable exchange gifts portion where the prize is yours by simply pointing out a distinctive characteristic of the giver. We can all count on a lot of wholesome fun for a minimal fee (thanks to PLDT), *BUT*, this party won't be half the fun as a 100% attendance.

Can we count on your presence on Dec. 13?

## ORSP PRESIDENT LECTURES AT AIM, UP

ORSP's President, Elise del Rosario, was featured speaker on two occasions. She talked on OR applications in San Miguel Corporation to a group of Asian Institute of Management students last September 8, at the invitation of an ORSP member Dr. Purba Rao who was handling the course on Quantitative Techniques. The students were given an overview of how actual OR work could and have helped decision makers.

A month later, on October 8, she spoke on "OR in Production Management" at a seminar entitled "The Efficient Management of Production Operations" sponsored by the National Engineering Center at the University

of the Philippines. In attendance were 70 production managers, supervisors, production planning managers, and plant industrial engineers from various manufacturing concerns. Made up of a series of lectures by various speakers from industry and UP, the seminar was held for 6 consecutive Saturdays starting August 20.

In this specific session she dealt with a description of OR as well as OR techniques commonly used in production planning and scheduling such as linear programming, mixed integer programming, dynamic programming and heuristics. The talk also involved a detailed description of two actual production scheduling applications.

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### OR LECTURE SERIES

Leonida T. Africa conducted a series of lectures on Operations Research during a seminar series sponsored by the Catholic Education Association of the Philippines, National Capital Region - Mathematics Committee. The lectures were held November 2-3, 1988 at St. Paul College of Quezon City and covered Markov Analysis, Queueing, and Simulation as tools for decision making.

### MEMBER WRITE-UPS

Do you know of any ORSP member who obtained a scholarship, was promoted or awarded a prize, published a paper, gave a lecture, or attended an OR conference? Write-ups

of this nature are most welcome by the Research and Publications Committee for release in the ORSP newsletter. Please get in touch with Manny Agustin at 722-3409, San Miguel Corporation, OR Department.

### ORSP TECHNICAL JOURNAL

The Research and Publications Committee is inviting all members to contribute technical papers for the maiden issue of the ORSP TECHNICAL JOURNAL to be released in March, 1989. More details will follow.

# KOREA, JAPAN HOST INTERNATIONAL OR CONFERENCES

Two major international OR conferences were held in Asia recently and attended by hundreds of academicians and practitioners from all over the world (including 2 ORSP members from the Philippines).

The Association of Asia-Pacific OR Societies (APORS) conference was held in Seoul from August 24-26, and hosted by the Korean OR Society. In attendance were approximately 300 professors and practitioners from East Asia. Topics in the 3-day event centered on recent applications and experiences in General OR, Combinatorial Optimization, LP/NLP, Forecasting, Inventory Management, and various corporate applications.

Held in Tokyo 3 days later thru the auspices of the Mathematical Programming Society and the OR Society of Japan, was the 13th Mathematical Programming Symposium. Featured here was an impressive line-up of speakers and noted authors from Europe and the United States. The 5-day symposium attracted over 800 participants. Topics ranged from Mathematical Programming theory and applications, to Dynamic Programming, Network Theory, Stochastic Programming, and Combinatorial methods. Dr. George Dantzig, known as the father of the Simplex Algorithm, lectured on "Parallel Processing" and predicted this as a major field of interest in OR. A further highlight were recent results in the "Interior-Point Methods" for

LP and ILP, more particularly the Karmarkar Algorithm, which may eventually phase out the Simplex. Dr. Narendra Karmarkar, author of the algorithm, gave a series of talks on the recent additions to his work.

Sammy Cruz and Pam Perfecto of the San Miguel Corporation, OR Department, were the ORSP participants to these conferences.

## CALL FOR PAPERS

Papers to the following OR and MS oriented conferences are now being accepted.

1. The Operations Research Society of America (ORSA), and the Institute of Management Sciences (TIMS), are jointly sponsoring the Third ORSA/TIMS Special Interest Conference on Operations Research Models and Applications. The conference will deal with "Flexible Manufacturing Systems" and will be held at the Massachusetts, USA August 14-16 1989. Interested parties may address papers to. TIMS/

ORSA, 290 Westminster St., Providence, RI. USA 020903. Deadline for submission is February 10, 1989.

2. The International Federation for Information Processing (IFIP) will be sponsoring the 14th IFIP conference on System Modelling and Optimization at Leipzig, German Democratic Republic, July 3-7, 1989. Abstracts and software description must be submitted by December 15, 1988 to Dr. K. Tammer, Leipzig University of Technology, Department of Mathematics & Informatics, PF 66, Leipzig, 7030, GDR.

3. The International Federation of Operations Research Society (IFORS) is organizing a conference on OR and Decision Support Systems, to be held at Linkoping, Sweden, June 12-13, 1989. Abstracts can be submitted to Henrick Jonsson, Dept. of Mathematics, Linkoping Inst. of Technology, S-581 83 Linkoping, Sweden on/or before 15 December 1988.

## ORSP NEWSLETTER Volume 2 Number 2

Manuel M. Agustin

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### OPERATIONS RESEARCH SOCIETY OF THE PHILIPPINES

Funds Position as of October 11, 1988

Cash In Bank , June 15, 1988	P 9,227.40
Deposits, June 30 - Sept. 30, 1988	8,600.00
Total Cash In Bank	<u>P 17,827.40</u>
Cash On Hand	2,590.00
Accounts Receivable	<u>1,228.31</u>
Total Funds	<u>P 21,645.71</u>
Accounts Payable	<u>5,329.70</u>
 NET FUNDS BALANCE	 <u><u>P 16,316.01</u></u>

## AN MIP MODEL FOR THE WAREHOUSING PROBLEM

*by: Manuel M. Agustin*

One of the important concerns of physical distribution managers is determining the optimum number, location, size, and delivery areas of warehouses given  $I$  candidate sites,  $K$  possible sizes, and  $J$  demand centers. A common objective is to minimize total trunking, routing, and warehousing costs over a given planning period.

A Mixed Integer Programming (MIP) formulation of the problem is shown below:

### Subscripts:

$i$	= warehouse location	$i$	= $1, \dots, I$
$k$	= warehouse size	$k$	= $1, \dots, K$
$j$	= demand center	$j$	= $1, \dots, J$

### Decision Variables:

$Y_{ik}$	= 0/1 variable where 1 indicates that a warehouse of size $k$ at site $i$ is selected
$X_{ij}$	= Volume of full goods supplied from warehouse $i$ to demand center $j$

### Parameters:

$F_{ik}$	= Fixed cost of operating a warehouse of size $k$ at site $i$
$t_{ij}$	= Trunking cost from plant to warehouse $i$ plus routing cost from warehouse $i$ to demand center $j$ per unit of product
$D_j$	= Volume of full goods required by demand center $j$
$C_k$	= Capacity of warehouse with size $k$

### Formulation:

$$\begin{aligned} \text{Minimize total cost} &= \text{Fixed Cost} + \text{Distribution Cost} \\ &= \sum_i \sum_k F_{ik} Y_{ik} + \sum_i \sum_j t_{ij} X_{ij} \end{aligned}$$

Subject to:

(1) A warehouse in a particular site should have a unique size.

$$\sum_k Y_{ik} \leq 1 \quad i = 1, \dots, I$$

(2) Total volume of full goods for each demand center has to be satisfied.

$$\sum_i X_{ij} \geq D_j \quad j = 1, \dots, J$$

(3) Capacity of each warehouse should not be exceeded.

$$\sum_j X_{ij} \leq \sum_k C_k Y_{ik} \quad i = 1, \dots, I$$

The above formulation assumes that there is only one plant or production center. It also treats routing cost as being variable per unit of product which may not always be the case.

With minor modifications, the model can be made to handle multi-plant situations and determine optimum timing of warehouses.



## THE PRESIDENT'S CORNER

Elise A. Del Rosario

### A Challenge From Bill, Lem and Bert

"I don't seem to recall these committees in the ORSP Constitution", remarked a member — referring to the list of committees in the ORSP application form. He sure knew his Constitution — which provided for the establishment of Membership, Finance, Research and Publications, Programs, and External Affairs Committees.

In the Board Meeting of May 3, 1988 some board members raised questions which raised more questions.

Focus was put on issues that could not be ignored, and yet did not seem to be assigned to specific committees. These issues were,

- What is the long term direction of the organization, given its objectives stated in the Constitution? What strategic plans must be set in motion to achieve these objectives? Where are we headed? For the next ten, twenty years, how do we get there?
- How can we contribute to the further OR training of our membership? How can the organization contribute towards better education of the future practitioners and academicians? Can this organization be a conduit for bridging the gap bet-

ween practice and academe?

- We call ourselves ORSP, and yet are we undertaking projects by which we could show what OR is and how it could help address national problems? Should we not make ourselves relevant, considering the multitude of national problems that lend themselves to OR solutions?

Thus were born the Long Range Planning, Education and Training and Special Projects Committees, headed by our able Board Members Lem Miravalles, Bert Navarrete and Bill Torres. Under their leadership, we will strive to act on the questions thus posed.

Are you challenged by these concerns? Bill, Lem and Bert welcome you.

### SUGGESTED READINGS ON WAREHOUSING APPLICATIONS

- (1) P.J. Dohrn, *Depot Location with Van Salesman*, Omega Vol 1 No. 3
- (2) R.M. Lawrence and P.J. Pengilly, *The Number and Location of Depots Required for Handling Products for Distribution to Retail Stores in Southeast England*, Operational Research Quarterly, Vol. 2 No. 1
- (3) E. Feldmand, F.A. Lehrer and T.L. Ray, *Warehouse Location Under Continuous Economies of Scale*, Management Science, Vol. 12 No. 9
- (4) A.G. Gizelis and J. Samouilidis, *A Simplified Algorithm for the Depot Location Problem*, Omega Vol. 8 No. 4
- (5) L.B. Ellwein and P. Gray, *Solving Fixed Charge Location — Allocation Problems with Capacity and Configuration Constraints*, AIIE Transactions Vol. 3 No. 4
- (6) D.W. Beattie, *Improving the Structure of a Distribution System*, Operational Research Quarterly, Vol. 24 No. 3
- (7) A.A. Kuehn and M.J. Hamburger, *A Heuristic Program for Locating Warehouses*, Management Science 9
- (8) J.R. Wanty, *A Practical Application of the Warehouse Problem — Location of Depots in a Petroleum Company*, Operational Research Quarterly Vol. 9
- (9) L. Cooper, *Location — Allocation Problems*, Operations Research Vol 11
- (10) R.J. Atkins and R.H. Shriver, *New Approach to Facilities Location*, Harvard Business Review May-June 1968