ORSP Newsletter

Volume 2 Number 1 August 1988

GENERAL RAMOS TO INDUCT ORSP OFFICERS

ORSP will hold its 1988 Induction of Officers on August 9, 7 PM, at the Manila Peninsula Hotel. The Inducting Officer and Keynote Speaker is the Honorable Secretary of National Defense, Fidel V. Ramos.

General Ramos was unanimously chosen by the new board in cognizance of OR's roots in the military. In his July 18 letter to incoming ORSP President Elise A. del Rosario, the erstwhile Chief of Staff of the Armed Forces of the Philippines graciously accepted the invitation and expressed his desire to be of continued service to ORSP and to the Filipino people. His views on OR's potential contribution to the economic development of the country will serve to bolster ORSP's goal of national relevance.

To be inducted into office are:

Elise A. del Rosario	President
Leonida T. Africa	Vice-President
Diosdado C. Engbino	Secretary
Ramon Angelo Tanchoco	Treasurer
Lemuel M. Miravalles	Board Member
Norberto R. Navarrete	Board Member
William T. Torres	Board Member

Republic of the Philippines
DEPARTMENT OF NATIONAL DEFENSE
Camp General Emilio Aguinaldo, Quezon City

Ms. Elisa A. del Rosario
Incoming President, Operations Research Society of the Philippines
c/o San Miguel Corporation
6766 Ayala Avenue, Makati
Metro Manila

Dear Ms. Del Rosario:

I am pleased to accept your invitation as guest speaker and inducting officer of the Operations Research Society of the Philippines (ORSP) on August 9 at 7:00 p.m.

I hope to be of continued service to your organization and to our people in our continuing pursuit of the peace and stability we need to accelerate economic development and attain progress for our country.

Congratulations to the officers and best wishes to the members of ORSP.

Very truly yours,

FIDEL V. RAMOS
Secretary

ORSP Holds 2nd General Assembly

The second annual General Assembly of the ORSP was held last March 23, 1988 at the Development Academy of the Philippines in Pasig.

Invited as Guest of Honor and Speaker was Felimon T. Berba, Jr., President of the Philippine Electric Corporation, who expounded his vision of "Operations Research Practice in the Philippines in the year 2000". He stressed that for OR to succeed in the Philippines, now or in the year 2000, great

see ORSP p. 2.

Next Big Event

As a step toward advancing the development and practice of OR in the Philippines, ORSP has invited Dr. Geoffrey N. T. Lack, a seasoned OR practitioner and consultant, to speak on:

- Setting up an OR department;
- OR applications in developing countries;
- OR applications in government.

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efforts need be exerted to motivate people to be productive; and that a framework, be it composed of machines, processes, or optimization techniques, must focus on people as the primary moving and controlling factor.

An open forum ensued, with representatives from government, business, industry and the academe exchanging views in response to Mr. Berba's ideas.

In accordance with the ORSP's Constitution and By-Laws, the members elected the new Board of Directors for a regular two-year term. A total of 17 regular members were nominated among whom the following were elected:

Prof. Leonida Africa
(De La Salle University)

Dr. William Torres
(National Computer Center)

Ms. Elise del Rosario
(San Miguel Corporation)

Mr. Diosdado Engbino
(San Miguel Corporation)

Dr. Arthur de Guia
(Colgate Palmolive, Phil. Inc.)

Mr. Lemuel Miravalles
(Rengo Consultants)

Dr. Jose Carlos, Jr.
(Phil. Refining Company)

Tied for the eighth slot were:

Dr. Norberto Navarette
(UP, Los Banos), and

Mr. Ramon Angelo Tanchoco
(Office of Sen. Vicente Paterno)

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Presently an Associate Director of Coopers & Lybrand WD Scott (Australia), Dr. Lack is one of the firm's most experienced consultants in the use of quantitative techniques for decision making. His expertise includes mathematical optimization, cost/benefit analysis, computer modelling, and decision analysis, which he has applied in such areas as transport and resource development, production, distribution, investment and corporate planning both for government and private clients.

He has completed various assignments in ten countries and is the author of nine technical papers. In 1971, he helped organize the OR Department of San Miguel Corporation where he continues to serve as a consultant.

Dr. Lack holds a Bachelor's Degree in Mathematics and Electrical Engineering from the University of Sydney, a Master's Degree in Electrical Engineering and a Doctorate in Engineering Economic Systems, both from Stanford University. He is a member of the Australian Society for Operations Research, the Operations Research Society of America, and the Institute of Electrical and Electronics Engineers.

Dr. Lack's lecture is scheduled on October 1st, 9:00 AM – 12:00 PM, at the Ateneo Professional Schools in Makati.

The proceedings were handled by the Election Committee composed of Mr. Ronald Bútiong as Chairman, and Ms. Ena Wad and Ms. Mary Jane Azurin as members.

ORSP SPEAKERS IN PCS '88 BREAKTHROUGH

Two ORSP members spoke at the technical sessions of '88 Breakthrough, an international exhibition and conference on information technology, organized by the Philippine Computer Society. The conference, held at the Philippine International Convention Center from May 10-14, 1988, featured an impressive line-up of local and foreign speakers from various fields on information technology – management, application, technical, and entrepreneurial.

Ms. Elise A. del Rosario, AVP and Operations Research Manager of San Miguel Corporation, spoke on "OR in Decision Support: The Experience of a Diversified Manufacturing Firm." She discussed a wide range of OR applications in SMC and highlighted the value of OR as a decision support tool for management.

Mr. Manuel M. Agustin, Assistant OR Consultant, SMC, also presented a talk entitled "Solving Plant Planning Problems on the Computer". He focused on two OR methods used to determine the optimum number, location, capacity and timing of production facilities over a long-term planning horizon. (See page 5 for an abstract of his talk.)

Interested in joining ORSP?

Dial 722-3409.

International Conferences

Communications have been received regarding the following international conferences on areas related to Operations Research.

1. The Management Science/ Operations Research Society of Malaysia is sponsoring a workshop for Operational Research Trainees in Asia 18-20 August, 1988. This will be held at the University Teknologi Malaysia and will cover topics on "Computers in Aid of Teaching OR Models for Managerial Decisions" and "Case Studies in O.R. Teachings in Developing Countries."

2. The IV Latin-Iberian-American Congress on Operations Research and Systems Engineering will be held at Rio de Janeiro, 17-21 October 1988. This will coincide with the XXI Brazilian Symposium on Operations Research.

3. On November 7-9, 1988, the International Association for the Advancement of Modelling and Simulation Techniques in Enterprises (AMSE) will be sponsoring a conference in China. AMSE, which is presently based in France, is inviting paper presentors to submit summaries of about 300 words for the conference.

4. The 2nd International IFIP/IFAC/IFORS Workshop on Artificial Intelligence in Economics and Management is being organized by the Institute of Systems Science of the National University of Singapore. The organizers of the workshop, which is scheduled for January 11-13, 1989, are inviting prospective presentors to submit 700-word extended abstracts of their proposed paper.

5. IFAC/IFORS/IMACS will sponsor another symposium, this time on "Large Scale Systems: Theory and Applications" in Berlin, German Democratic Republic, August 29-31, 1989. This is specifically being organized by the Scientific Society for Measurement and Automation in the Chamber of Technology of the German Democratic Republic.

The Operations Research Society of the Philippines is expected to host the ASIANET Teachers' Workshop to be held in October, 1989. Details of this workshop will still be worked out with ASIANET.

Anyone interested in any of the above conferences may get in touch with Leonida T. Africa, Vice-President for Academic Programs, DLSU at telephone number 59-63-71.

Foreign Stint For 2 ORSP Members

San Miguel Corporation's Sammy Cruz and Pam Perfecto will be off to Korea and Japan for two international OR conferences later this month.

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PROGRAM OF ACTIVITIES (1988 – 1990)

Month/Year	Activity
May, 1988	PCS Convention
August	Induction of Officers
October	Lecture by G.N.T. Lack
November/December	OR Symposia in Schools
December	X'mas Get-Together
March, 1989	Generaly Assembly
May	Co-host ASEAN Regional Conference with NEC
August	Seminar/Workshop
October	Host ASIANET Teachers' Workshop
December	X'mas Get-Together
March, 1990	Host International OR Conference

THE PRESIDENT'S CORNER

Elise A. Del Rosario

Help Make It Happen

Once there was a dream – a dream to unite people who would look after the advancement of OR/MS as a vital discipline in the Philippines. Within this dream was a goal: to contribute to the betterment of society through scientific means of handling complex problems. Slowly the dream is becoming a reality. With the formation of ORSP, OR enthusiasts, practitioners and academicians now have a forum to air their views.

During the first year of ORSP, attendance in general membership meetings averaged only, 35, a meager 36% of paid membership. If we are to realize our dream, we need your commitment. The Board is but a small group of individuals which is there to plan and initiate activities. But it needs you to carry them out and make each undertaking a success.

While the Board has set a two-year calendar of activities, it is fully aware of the need to be flexible and adaptive. Speak up and say what you want to see happen. Help make it happen. Whatever it is you do best, there is a place for you in ORSP.

Are you interested to see the organization healthy in terms of member strength? The Membership Committee headed by Dado Engbino may be for you. Do you have a knack for handling money and generating more of it? Finance Committee head Chito Tanchoco beckons you. Or are you the type who loves to write technical or news or even literary pieces? Manny Agustin would sign you up at once for the Publications Committee. Are you the logistics person – the person who would want to plan affairs, and monitor their execution? Committee Chairman Sam Cruz for Technical Programs and Pam Perfecto for Social Affairs extend their invitation.

Would you like to be the ORSP link to the other organizations – both local and international? External Affairs Committee Chairman, Nida Africa needs a team to do this effectively. Or would you rather solve real world problems through OR techniques? Special Projects Committee may be for you, and this is headed by Bill Torres. If your concern is where the club is headed, Lem Miravalles of Long Range Planning needs you. Or, if your inclination is on training and curriculum matters, Bert Navarrete would welcome you to his Education and Training Committee.

The birth pains are gone. We've reached a fork in the road. One leads to greatness, the other oblivion. Would you want to see the day when ORSP is as big as organizations like PMAP, PCS, PICPA? Would you want to see the day when you need not explain to people what OR means and what it does? Would you want to see scientific approaches being applied to solution of our national problems? If you've answered yes, you've chosen the path to greatness and fulfillment of our goals. You've taken the first step. Doing your share is the second. Can we count on you?

Foreign . . . from p. 3.

The first, scheduled August 24-26 in Seoul, is the First Conference of the Association of Asian-Pacific OR Societies (APORS) within IFORS. To be featured is a wide variety of algorithms and applications in such fields as Combinatorial Optimization, Transportation, Investment Analysis, and Manpower Planning.

The second, to be held on August 29 to September 2 in Tokyo, is the 13th International Symposium on Mathematical Programming, jointly sponsored by the Mathematical Programming Society and the OR Society of Japan. Noted lecturers will discuss classical and new techniques in Mathematical Programming, with special sessions on applications in communications and industry.

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Solving Plant Planning Problems on the Computer

By MANUEL M. AGUSTIN
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A significant aspect of strategic planning for large manufacturing firms is that of determining the expansion plan for a product or group of products which will satisfy demand at minimum cost or which will maximize overall profit. Generally, determining the optimal expansion plan over a long term planning horizon (5 to 10 years) involves answering four major issues:

(1) How many additional plants or production facilities should be put up?
(2) Where should these be located?
(3) What sizes should they have?
(4) When during the planning horizon should they be operational?

The guiding criterion in coming up with the optimal expansion plan is generally based either on minimizing cost or maximizing profit. As a result, the costs considered in plant planning normally include capital expenditures for land, building or equipment, variable operating costs (e.g., transport of raw materials and finished goods, power, direct labor) and fixed operating costs. Revenues are necessary when the objective defined is that of maximizing profit. Solving the plant planning problem involves finding the number, location, size, and timing of production facilities that will achieve an optimum balance among all these costs and revenues.

More often than not, the plant planning problem involves a large number of alternative expansion plans. This is because there are usually several options for the number, location, size, and timing of production units. If all combinations of these are enumerated, it can be seen that a typical problem easily runs into several hundreds or thousands of alternative plans.

Needless to say, a computer is necessary for this purpose. However, even with a computer, the plant planning problem is not easy to solve. For instance, in determining the location of plants, it is necessary to answer the question of how much each plant should serve each demand point. It is in this light that the science of Operations Research (OR) can be used. OR is a quantitative approach to decision making generally with the use of mathematical models that capture actual relationships of the variables under consideration. Two OR methods are commonly used in solving plant planning problems – Mixed Integer Programming (MIP) and Enumeration Techniques.*

The MIP approach is especially useful in solving large plant planning problems. It involves formulating a set of mathematical relationships that capture the logical interaction among the various options for the number, location, size and timing of plants. This mathematical model is subsequently fed into a software package that is designed to solve MIP formulations. There are a number of such software available and most are designed to run on mainframes because of memory and speed requirements. The MIP software automatically solves the mathematical model and gives the optimum expansion plan.

Enumeration techniques on the other hand involve costing out each alternative plan until all options are exhausted. This is possible only in cases when the number of alternatives is limited. Usually, it makes use of Linear Programming (LP) to optimally allocate plant capacities to demand centers for each alternative plan. Like MIP, LP is solved using available software packages. Provided that the problem is small, enumeration has certain advantages over MIP. First, MIP packages generally require mainframes which may not always be available. Enumeration techniques, on the other hand, can be totally implemented on microcomputers. A second reason is the high cost of MIP software compared to the more available LP packages.

It goes without saying, therefore, that the use of either MIP or Enumeration (and LP) to solve plant planning problems requires the skills of an Operation Research analyst. While intuition or gut feel sometimes works, the value of quantitative approaches to decision making cannot be overlooked, especially as regards plant planning problems which involve huge investments with long term implications on costs and profits.

** It is recommended that the reader refer to any standard OR textbook for an explanation of the techniques discussed in this article.*

AN MIP FORMULATION OF THE PLANT PLANNING PROBLEM

by Ronald Q. Butiong

Consider the general problem of determining the optimum number, location, size, and timing of plants to open given m candidate plant sites, r possible plant sizes, and n "marketing areas" or "demand centers." Management's objective is to satisfy demand for its product in the next p years at minimum fixed and distribution costs.

The problem can be formulated as a Mixed Integer Programming (MIP) problem as follows:

Subscripts:

i	=	plant size;	i	=	1, . . . m
j	=	demand center;	j	=	1, . . . n
k	=	plant size;	k	=	1, . . . r
t	=	year;	t	=	1, . . . p

Decision Variables:

x_{ikt} = 0/1 variable where one means to open a plant of size k at site i in year t

y_{ijt} = volume of full goods to be transported from plant at site i to demand center j in year t

Parameters:

F_{ikt} = fixed cost of operating a plant of size k at site i in year t

C_{ijt} = cost of transporting one product unit from plant at site i to demand center j in year t

D_{jt} = volume of demand at demand center j in year t

E_{ik} = capacity of a plant of size k at site i

Formulation:

Minimize Total Cost = Fixed Cost + Distribution Cost

$$= \sum_{i}\sum_{k}\sum_{t} F_{ikt}\, x_{ikt} + \sum_{i}\sum_{j}\sum_{t} C_{ijt}\, y_{ijt}$$

Subject to:

1. Only one plant of a particular size could be set up in one site throughout the planning period.

$$\sum_{k}\sum_{t} x_{ikt} \leq 1 \qquad i = 1, \ldots m$$

2. Annual demand for each demand center has to be satisfied.

$$\sum_{i} y_{ijt} \geq D_{jt} \qquad j = 1, \ldots n; \quad t = 1, \ldots p$$

3. Capacity at each plant should not be exceeded.

$$\sum_{j} y_{ijt} \leq \sum_{k} \sum_{l=1}^{t} E_{ik}\, x_{ikl} \qquad i = 1, \ldots m; \quad t = 1, \ldots p$$

The above formulation provides a basic framework of an MIP formulation of the plant planning problem. With slight modification, it can be expanded to include additional constraints and parameters.

Reference: Operations Research, A Managerial Emphasis
by Ronald Hartley