ORSP Newsletter

Volume 2 Number 3 March 1989

ORSP Holds General Assembly in April

ORSP will hold its annual general assembly on April 21, 1989. This year's gathering will be held at the Andres Soriano Executive Center (ASEC), SMC Building, Ayala Avenue at 3:00 PM.

Top OR experts from business and the academe have been invited to give lectures on recent OR applications, with special focus on experience in the implementation of OR models. Among the lectures will be project presentations from NEC (UP), PLDT, and PAL.

A special election will be held after the lectures to fill up four slots in the ORSP Board of Officers. Board members Bill Torres, Lem Miravalles, Bert Navarrete, and Chito Tanchoco have given up their positions due to very pressing commitments. ORSP President Elise del Rosario will also report on long-range plans to the membership, including the hosting of an international conference in late 1990.

ORSP President Elise del Rosario inducts officers of the HAU Student Chapter.

First ORSP Student Chapter Formed

The Holy Angel University (HAU) in Angeles City formed the first Student Chapter of ORSP in ceremonies held last February 4, 1989.

The formation was spearheaded by three of the university's faculty members—Lina Tumarong, Alda Gomez, and Leo Tago.

The first part of the event was a symposium on Operations Research applications in San Miguel Corporation. ORSP President Elise A. del Rosario spoke on a wide range of actual OR projects in facilities planning, warehousing, production planning, vehicle scheduling, and risk management. The second speaker was

see First p. 2

Student Chapters

The ORSP By-Laws provide that students of Operations Research/Management Science who are at least in their junior year in college may be admitted as Associate Members to the Society. Where student chapters have been formed, the student associate member shall be affiliated with one of these Chapters. Student Chapters provide the structure through which ORSP's objective of promoting and supporting the education and training of potential OR/MS practitioners in the country can be attained.

Following are some guidelines which can assist colleges and universities form their respective Student Chapters.

A. General Guidelines

1. A Student Chapter is assigned a Faculty Adviser. Any faculty member who is a Regular Member of ORSP is qualified to become a Faculty Adviser. However, members of the Chapter may elect to have more than one adviser.

2. Only students currently enrolled in or who have taken OR/MS, Mathematics, or Statistics, and who are at least in their junior year in college are qualified to become members of the Student Chapter.

see Student p. 2

Lem Miravalles Gets Harvard Fellowship

The United States Agency for International Development (USAID) has given Lem M. Miravalles, ORSP Board Member, a fellowship grant to the Harvard Institute for International Development, Harvard University, from June to August this year in

see Lem p. 6

Student from p. 1

3. To be affiliated with ORSP Inc., Student Chapters are required to register with the ORSP and pay the annual affiliation fee in the amount to be determined by the ORSP Board of Directors.

4. Student Chapters duly recognized by ORSP Inc. must submit to the latter through the ORSP Secretary an annual report of its activities for the school year just concluded.

B. Organizational Phase

1. A faculty member who is a Regular Member of ORSP Inc. or students qualified to become Associate Members can initiate and hold organizational meetings. It is desirable that the ORSP Secretary or his duly authorized representative be present during these meetings. These meetings are aimed at:

- identifying organizational structure
- drafting Constitution and By-Laws

2. A Student Chapter General Assembly is called to:

- ratify Constitution and By-Laws
- conduct a business session to elect officers or plan activities for the school year

3. Student Chapter Secretary submits to the ORSP Inc. the following:

- copy of ratified Constitution and By-Laws together with members' signatures
- list of officers and members
- program of activities for the current school year

Every year thereafter, the members elect a new set of officers and submit the last two documents above.

4. Elected officers and members shall be duly inducted by the ORSP Inc. President, the Secretary or their duly authorized representative. An OR symposium may also take place during this time.

First from p. 1

Manny M. Agustin, chairman of ORSP's Research and Publications Committee, who lectured on the use of Mathematical Programming in investment decisions.

The induction of the 134 officers and members of the newly formed organization followed the symposium. Ms. Elise del Rosario inducted into office the following officers:

Corazon Ramoneda	President
Zenaida Agabon	VP (Internal Affairs)
Jovenar Bautista	VP (External Affairs)
Ana Joy Dungca	Secretary (Engineering)
Mary Grace Tangiao	Secretary (BA)
Anita Delos Reyes	Treasurer
Joselito Aguas	Auditor
Allan Piedra	P.R.O.

Education and Training Committee

Ma. Theresa Carreon	Chairman
Dy Shuk Ching	Vice-Chairman

Research Committee

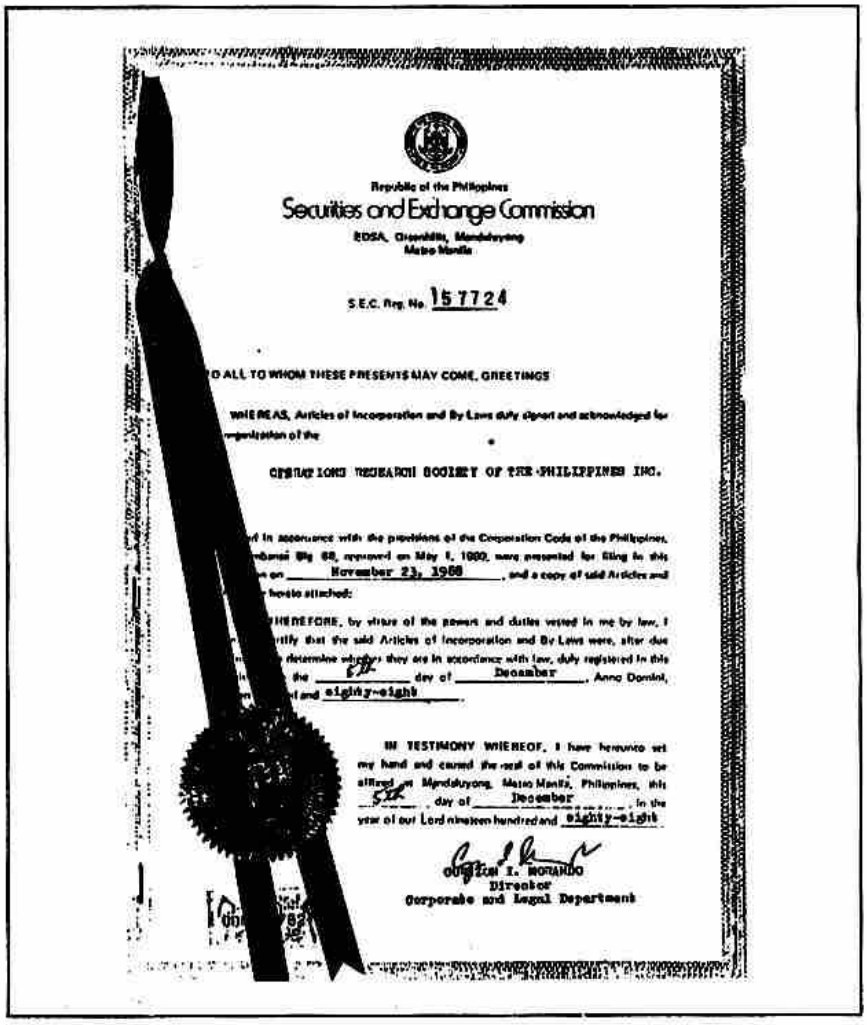
Marlene Canlas	Chairman
Ma. Elena Yabut	Vice-Chairman

Socials and Civics Committee

Alfred Lumanlan	Chairman
Rosemarie Lim	Vice-Chairman

Adding prestige to the occasion was the presence of some of the university's key officers and faculty members who pledged their support to the organization. Dado Engbino, ORSP Secretary, also gave a brief history of ORSP.

The ORSP-HAU Student Chapter seeks to develop and enhance decision-making skills of HAU's Engineering and Business Administration students through exposure to the OR discipline.



Republic of the Philippines
Securities and Exchange Commission
EDSA, Greenhills, Mandaluyong
Metro Manila

S.E.C. Reg. No. 57724

TO ALL TO WHOM THESE PRESENTS MAY COME, GREETINGS

WHEREAS, Articles of Incorporation and By-Laws duly signed and acknowledged for incorporation of the

CHRISTIAN LORD RESEARCH SOCIETY OF THE PHILIPPINES INC.

...in accordance with the provisions of the Corporation Code of the Philippines, ...amended Blg 68, approved on May 1, 1980, were presented for filing in this ...on November 23, 1988, and a copy of said Articles and ...hereto attached;

WHEREFORE, by virtue of the powers and duties vested in me by law, I ...certify that the said Articles of Incorporation and By-Laws were, after due ...determine whether they are in accordance with law, duly registered in this ...the 5th day of December, Anno Domini, ...and eighty-eight.

IN TESTIMONY WHEREOF, I have hereunto set my hand and caused the seal of this Commission to be affixed at Mandaluyong, Metro Manila, Philippines, this 5th day of December, in the year of our Lord nineteen hundred and eighty-eight

...I. MONARDO
Director
Corporate and Legal Department

1988 Highlights

Honorable Secretary Fidel Ramos with newly inducted ORSP board members during induction rites on August 9, 1988 at the Manila Peninsula Hotel.

Outgoing ORSP President Bill Torres receives plaque of appreciation.

Dr. Geoff Lack shares his expertise with OR enthusiasts in a well-attended symposium on October 1.

Dr. Lack with members of the ORSP Board.

ORSP Secretary Dado Engbino lectures before Holy Angel students.

ORSP officers and HAU faculty with officers of the first ORSP Student Chapter.

...Party...Party...Party...

SMC OR – looking lively and . . . out of character.

Waiting for the next flight.

Smile folks, this is the best part!

PLDT – better seen than heard, don't you think?

An OR ritual before the mathematical formulation.

See, it was fun – don't miss it next year.

THE PRESIDENT'S CORNER

Elise A. Del Rosario

Tools or Solutions?

"What an elegant model!"

"Sure is a smart way of formulating the problem."

To me as the model builder, this may sound as the ultimate praise and recognition of my skills. To me as an OR practitioner however, this remark is cause for concern. It confirms what I have long suspected—OR has mostly been associated with the techniques that it employs. Of course, there had been a lot of help from journals and individuals who knowingly or unknowingly propagate the belief that OR's contributions consist mainly of theorems, proofs and algorithms. Most people I know associate my profession with Stochastic and Deterministic Models, MIP, DP, Queuing Theory, and others.

Did I hear you say, "So what are you complaining about?" Let me ask you, do you associate a carpenter with his workbench, hammer, saw, and other woodworking instruments? No! You associate him with the structures he has built. Do you normally think of a lawyer in terms of his professional library and his data bases? No—you value his competence in the cases he has handled and defended. Do you think of a computer programmer in terms of his knowledge of BASIC, PASCAL, FORTRAN, etc.? No, you think in terms of that system which churns out your payslips or generates your monthly bills.

The primary objective of OR is to solve real-world decision problems. As such, emphasis must not be on the techniques it uses, but rather on its contributions to real-world decision making processes. In my talks, I have gone to the extent of generalizing that a study which does not help in decision making cannot be a product of OR.

I call upon you to take the first step towards banishing the image of the OR professional as one who can only take pride in the tools he uses. It is time to unveil the OR professional and his contributions towards making this country, this world a better place to live in.

With this in mind, the Programs Committee has decided on the theme "OR Solutions" for the 1989 General Assembly. As a follow-up, all are invited to share their successes and failures in applying OR. These would be published in the first-ever ORSP Journal which will strive to cater not only to the technical practitioner but also to the non-technical manager.

Surely, this cause is worth your time. Papers must be addressed to Manny Agustin, Editor c/o San Miguel Corporation, 40 San Miguel Avenue, Mandaluyong, Metro Manila. Deadline is May 15.

A HEURISTIC SOLUTION TO THE VEHICLE ROUTING PROBLEM

by Manuel M. Agustin

A common problem in physical distribution is that of routing a fleet of vehicles from a central facility to a number of customers. Generally, each vehicle leaves the central depot, visits a known set of customers, and returns to the depot before a specified amount of time has elapsed. The problem is to determine how many routes are needed and the itinerary of each route such that total travel time or distance is minimized.

The vehicle routing problem can be modeled as a mixed integer programming problem. However, the resulting problem size is usually so large that it becomes impractical to solve. Hence, heuristic techniques have been developed over the last 25 years to address this problem together with the many complicating factors commonly encountered in actual routing situations.

The solution technique described in this article addresses the simple routing case described above where the only constraint is the total travel time allowed for each route. However, it is flexible enough to handle additional constraints like varying vehicle capacities or time windows specified by customers.

This heuristic algorithm was developed by G. Clarke and J. W. Wright and has come to be known as the savings method. It is by far, the most commonly used heuristic for the vehicle routing problem. To illustrate the technique, consider a small problem of 5 customers. Assume that 13 time units are available for each vehicle. The travel times from point to point are given in Table 1.

	D	1	2	3	4	5
D	-	4	6	5	4	3
1	4	-	2	3	5	7
2	6	2	-	2	5	9
3	5	3	2	-	3	8
4	4	5	5	3	-	6
5	3	7	9	8	6	-

Table 1: Interpoint travel time (D is the depot)

See Heuristic p. 6

Heuristic from p. 3

The first step in the procedure is to calculate for each pair of customers the travel time saved by joining or linking the pair in a single route. For instance, consider customers 1 and 2. The savings computation is done as follows:

Travel time without linking = $t_{D1} + t_{1D} + t_{D2} + t_{2D}$

Travel time with linking = $t_{D1} + t_{12} + t_{2D}$

Savings = Travel time without linking – Travel time with linking = $t_{1D} + t_{D2} - t_{12}$

These computations are done for all possible pairs of customers, and a ranked list of these values is created. The list is ranked in order of travel time saved from highest to lowest. The resulting list for the sample problem is shown in Table 2 below.

Pairings	Savings
2-3	9
1-2	8
1-3	6
3-4	6
2-4	5
1-4	3
4-5	1
1-5	0
2-5	0
3-5	0

Table 2: Ranked list of travel time savings

The pairing with the highest travel time saved is selected first for a route and a feasibility check is performed to determine if a vehicle has adequate travel time available to travel from the depot to that pair of customers and back to the depot. In this case, the initial pairing is (2-3) and the resulting route is (D-2-3-D). Total travel time is 13; therefore, the initial route is feasible.

The next pair in the ranked list, (1-2), is then considered. It can be seen that this pair can link to the initial route without causing total travel time to exceed 13. This results in the route (D-1-2-3-D). Note that additions to existing routes may be done only at the end points of the route. In the example, a pairing such as (2-5) may not be added to the initial route (D-2- 3-D).

The same procedure is followed for each pair in the ranked list. The pair (1-3) is ignored because both customers are already in an existing route. (3-4) may be linked to the initial route but this violates the travel time constraint; hence, it is likewise ignored. Also, (2-4) and (1-4) may not be joined to the initial route because this breaks the sequence already established. The next pair, (4-5), can start a new route since both customers are not yet linked to any existing route. At this point of the process, all customers are assigned to routes so the algorithm is completed. Thus, the final routes are (D-1-2-3) and (D-4-5).

For larger problems, the procedure continues in exactly the same manner with feasibility checks being performed each time a customer is added to an existing route. If the vehicle's capacity is exceeded by the addition of customers, another route is started.

References

(1) Clarke, G., and Wright, J. W., "Scheduling of vehicles from a central depot to a number of delivery points," *Operations Research*, Vol. 12, July-August, 1964.

(2) *Computers and Operations Research*, Vol. 10, Number 2 (special issue on routing and scheduling of vehicles and crews), 1983.

Lem from p. 1

recognition of his outstanding work in foreign-assisted projects.

Last October 15—November 4, 1988, Lem Miravalles was part of a 6-member World Bank Appraisal Mission that visited India to evaluate the technical, organizational, financial, and economic aspects of the Indian government's $400 M vocational training project being proposed for World Bank funding.

The World Bank hired Lem Miravalles as the Mission's management specialist based on his relevant expertise and experience. He was formerly director general of the National Manpower and Youth Council and project director of the NMYC World Bank vocational training project. At present, he is course director of the Ateneo Graduate School of Business Training Course on the management and implementation of foreign-assisted projects. The five courses he has conducted so far have trained about 200 project managers from about 50 government agencies.

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