# IFORS HAWAII 2005 Triennial

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**17th Triennial Conference of the International Federation of Operational Research Societies**

IFORS

**Hosted by the Institute for Operations Research and the Management Sciences INFORMS**

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**2 - Marginal analysis of multi-objective decision methods in the public sector**

*Eva Regnier*, Defense Resources Management Institute, Naval Postgraduate School, 699 Dyer Road, 93940, Monterey, CA, eregnier@nps.edu

Various methods are used to make multi-objective decisions in the public sector. Each has different implications for the marginal trade-offs among costs and benefits/objectives. Several common procedures are reviewed, with examples from health, defense, and environmental protection, and their policy implications in a hierarchical budget allocation process are explored.

**3 - Invariant Utility Functions (Generalized Zero-Switch Utility)**

*Ali Abbas*, School of Engineering, University of Illinois at Urbana-Champaign, 104 South Mathews Ave, 61801, Urbana, Illinois, United States, aliabbas@uiuc.edu

We present an invariance approach for reasoning about utility functions. This approach provides a general method to determine the functional form of a utility function under a given transformation on the attributes. We then present invariant utility functions and show how they generalize the notion of zero-switch utility functions.

**4 - Preference Modeling And Dynamic Resource Allocation In Not-for-profit Healthcare Organizations**

*Don Kleinmuntz*, Business Administration MC-706, U of Illinois at Urbana-Champaign, 1206 S 6th St, 61820, Champaign, IL, United States, dnk@uiuc.edu

US hospitals allocate resources to achieve both financial and nonfinancial objectives. Investment analyses are challenging because subjective assessments ignore complex interactions of financial and nonfinancial criteria. A dynamic model of hospital capital investment is used to compare heuristic strategies to a normative strategy. Descriptive and prescriptive implications are considered.

## MD-21

*Monday, 3:30-5:00pm*

*Lehua Suite*

### OR for Development Prize Competition II

Cluster: OR for Development Prize Finalist Sessions

*Invited session*

Chair: *L. Paul Fatti*, Statistics & Actuarial Science, University of the Witwatersrand, P.O. Wits, 2050, Johannesburg, South Africa, fatti@stats.wits.ac.za

**1 - A Framework Of Computational Systems And Optimisation Models For The Prevention And Combat Of Dengue**

*Marcos José Negreiros*, Mestrado Profissional Em ComputaÇÃo, Universidade Estadual Do CearÁ, Av Paranjana, 1700 - Campus do Itaperi, 60740-000, Fortaleza, CEARÁ, Brazil, negreiro@graphvs.com.br, *Adilson Elias Xavier, Nelson Maculan Filho, Philippe Michelon*

This work presents a logistical methodology that uses Information Systems for the prevention and combat of dengue, one of the major tropical diseases. It includes Geographic Information, WEB-Based, Hand-Held and Decision Support Systems. The framework gives an overview of the dengue logistical problematic and allows to optimize the combat process.

**2 - AlWehhda Water Resource Management (AWRM) Project: The Path to Sustainable Development in Southern Sudan**

*Nazar M. Hassan*, Mechanical Engineering Department, University of Khartoum, Faculty of Engineering & Architecture, P.O. Box 471, Khartoum, Sudan, Khartoum, Sudan, nmhassan05@yahoo.com

Development in Southern Sudan is but a daunting task due to economic, socio-political, and environmental reasons. Harnessing that "Flood Region" waters will seriously depend on the soundness of the engineering solutions proposed. We propose a water resource management scheme to rigorously pursue sustainable development and geopolitical stability in the region.

**3 - A decision support methodology for increasing public investment efficiency in Brazilian agrarian reform**

*João Neiva de Figueiredo*, Production and Systems Engineering Department, Federal University of Santa Catarina - UFSC, Campus Trindade - CTC/EPS, C.p. 476, 88010-970, Florianópolis, Santa Catarina, Brazil, jneiva@deps.ufsc.br, *Leonardo Melgarejo, Carlos Ernani Fries*

Agrarian reform programs have had limited success in developing countries. Challenges facing the Brazilian program are described and a methodology to overcome them is presented. The model uses multivariate analysis, DEA, and a consensus-building mechanism to improve new settlement success rates, identifying key drivers for relocated families to reach self-sufficiency.

**4 - Requisite Decisions by Development Stakeholders: The Case of Kenyan NGOs**

*Florence Omosa*, Operational Research, London School of Economics, Houghton Street, 53626, Nairobi 00200, Nairobi, Kenya, fomosa2001@yahoo.co.uk

NGOs in Kenya have faced various obstacles such as weaknesses of the approaches applied in project development. To overcome this shortcoming I developed and systematically applied a generative and participatory decision-making process, Kushauriana. Overall, Kushauriana improved the decision-making process of project development and of a project's performance and impact.

## MD-22

*Monday, 3:30-5:00pm*

*Kahili I*

### DEA02: Theoretical Issues on DEA II

Cluster: Data Envelopment Analysis and Performance Management

*Invited session*

Chair: *Maria Portela*, Rua Diogo Botelho, 1327, 4169- 005 Porto, Porto, Portugal, csilva@porto.ucp.pt

**1 - Zero Weights and Non-Zero Slacks: Different Solutions to the Same Problem**

*Maria Portela*, Rua Diogo Botelho, 1327, 4169- 005 Porto, Porto, Portugal, csilva@porto.ucp.pt, *Emmanuel Thanassoulis*

This paper re-assesses three independently developed approaches that aim at solving the problem of zero-weights or non-zero slacks in DEA.

The methods are weights restricted, non-radial and extended facet DEA models. We demonstrate the equivalence between these methods, both in their aim and in the solutions they yield. We also show that the aforementioned methods modify the frontier by extending existing facets or creating unobserved facets. Further we propose a new approach that uses weight restrictions to extend existing facets. This approach has some computational advantages, because extended facet models normally make use of mixed integer programming models.

### 2 - A comprehensive procedure for ranking DMUs in deterministic nonparametric DEA models

*José Solana Ibáñez*, Administration and Bussines Management, UCAM (Catholic University San Antonio of Murcia), Campus de los Jerónimos, s/n, 30107, Murcia, Spain, jsolana@pdi.ucam.edu, *Juan Gómez García*

This paper deals with the problem of designing a valid protocol for ranking DMUs in deterministic nonparametric DEA models. Our all-inclusive procedure to get an unbiased classification takes account of every necessary aspects to obtain an initial ranking with no subjective corruption and is illustrated with a real application.

### 3 - Applying DEA to Category Analysis

*Maximo Bosch*, Industrial Engineering, University of Chile, Republica 701, Santiago, Chile, mbosch@dii.uchile.cl, *Marcel Goic, Pablo Bustos*

To address the complexity of taking decisions on every sku, retailers organize their products in categories, which operate as BU and may have different strategic orientation. Performance is measured at several outputs :sales, margin, penetration. Inputs are space, promotions, assortment. An straightforward application of DEA to this problem is presented

### 4 - Assessing group performance with Malmquist Indices: the evaluation of the brand effect in retailing

*Ana Camanho*, Faculdade de Engenharia, Universidade do Porto, Demegi - Gein, Rua Dr. Roberto Frias, 4200-465, Porto, Portugal, acamanho@fe.up.pt, *Clara Vaz*

This study explores the differences in performance between two groups of grocery stores with different brands. The paper develops a Malmquist-type index to distinguish internal inefficiencies from those associated with the group (or brand) characteristics. A fundamental characteristic of the new index is to compare groups in a static setting.

## MD-23

*Monday, 3:30-5:00pm*

*Kahili II*

## Healthcare Modeling I

Cluster: Health Care

*Invited session*

Chair: *Michael Carter*, Mech & Ind Engineering, University of Toronto, 5 Kings College Rd, M5s 3g8, Toronto, ON, carter@mie.utoronto.ca

### 1 - A New Approach to Patient Safety in the Radiation Treatment Process for Cancer

*David Cooke*, University of Calgary, 2500 University Drive NW, T2n 1n4, Calgary, Alberta, Canada, dlcooke@ucalgary.ca, *Robert Lee, Peter Dunscombe*

This paper describes a novel approach to improve the safety of patients undergoing radiation treatment for cancer. The unique feature of this research is the way in which a quantitative operations research approach to risk analysis is being integrated with a more qualitative operations management approach to risk management.

### 2 - Assignment-Based Tabu Search for Scheduling Physicians in an Emergency Room

*Bernard Gendron*, Diro, Université de Montréal, C.P. 6128, succ. Centre-ville, H3c 3j7, Montréal, Québec, Canada, gendron@iro.umontreal.ca, *Jacques Ferland, Jean-Robert Quevillon*

Scheduling physicians in an emergency room is a complex task, which requires taking into account a large number of conflicting rules. We present a tabu search approach based on a classical assignment structure. We have developed specific rules to explore the neighborhood in order to minimize constraints' violations.

### 3 - Patient Clustering to support Simulation of patient Flow in Hospital Emergency Departments

*Andrzej Ceglowski*, Faculty of IT, Monash University, Po Box 63, 3800, Clayton, VIC, Australia, red.ceglowski@infotech.monash.edu, *Leonid Churilov*

Simulation models of hospital emergency departments have promised much but fail to deliver. The models fail because of inadequate patient classification. The objective of this paper is to demonstrate the use of nonparametric clustering techniques for patient classification and how this supports simulation of patient flow in emergency departments.

## MD-24

*Monday, 3:30-5:00pm*

*Hibiscus I*

## Economics II

Cluster: Economics

*Contributed session*

Chair: *Mustafa Karakul*, School of Admin. Studies, York University, 2nd Floor Atkinson Bldg. Rm 260A, 4700 Keele St., M3j 1p3, Toronto, ON, Canada, mkarakul@yorku.ca

### 1 - Dynamic Road Pricing and Network Equilibrium for Freeway Electronic Toll Collection System under Build-Operate-Transfer Arrangement

*Mei-Shiang Chang*, Department of Business Administration, Chung Hua University, No. 707, Sec. 2, Wu-Fu Road, Tung Shiang Li, 30067, Hsin Chu City, mschang@chu.edu.tw, *Che-Fu Hsueh*

A nonlinear programming model with a variational inequality constraint is proposed to determine time-varying tolls for freeway electronic toll collection system under build-operate-transfer arrangement. A modified Nelder-Mead simplex algorithm integrated with nested diagonalization method is elaborated to solve this problem. Numerical results are given to demonstrate its validity.

### 2 - Why is it worth paying the Cost to make the Work Fun for the Agent?

*Ryohei Matsumura*, Valdes, Tokyo Institute of Technology, 2-12-1, Ookayama meguro-ku, 152-8552, Tokyo, ryomatsu@valdes.titech.ac.jp, *Norimasa Kobayashi*

In standard agency models, only monetary incentive motivates the agent to work more. This paper proposes an agency model in which