Springer Proceedings in Business and Economics

Evangelos Grigoroudis
Michael Doumpos *Editors*

Operational Research in Business and Economics

4th International Symposium and 26th National Conference on Operational Research, Chania, Greece, June 2015

Springer

Springer Proceedings in Business and Economics

More information about this series at http://www.springer.com/series/11960

Evangelos Grigoroudis • Michael Doumpos
Editors

Operational Research in Business and Economics

4th International Symposium and 26th National Conference on Operational Research, Chania, Greece, June 2015

Springer

Editors
Evangelos Grigoroudis
Decision Support Systems Laboratory
Technical University of Crete
Chania, Greece

Michael Doumpos
Financial Engineering Laboratory
Technical University of Crete
Chania, Greece

ISSN 2198-7246 ISSN 2198-7254 (electronic)
Springer Proceedings in Business and Economics
ISBN 978-3-319-33001-3 ISBN 978-3-319-33003-7 (eBook)
DOI 10.1007/978-3-319-33003-7

Library of Congress Control Number: 2016946077

Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer International Publishing AG Switzerland

Preface

The Hellenic Operational Research Society (HELORS) was founded in 1963, with the aim to promote operational research (OR) in Greece and to provide a forum seeking to support the use of analytical methodologies in the Greek public and private sector.

One of the main activities of HELORS is the organization of its annual conference. Since the first national conference in 1977, HELORS has organized 26 National Conferences. Starting from 2012, the annual conference of HELORS is organized together with an international symposium, which provides a forum for exchanging ideas about the theory and practice of modern OR, not only among Greek researchers but also a broader international audience.

The 2015 event (4th International Symposium and 26th National Conference on Operational Research) was held in Chania, Greece, during June 4–6. The scientific program included 85 presentations by Greek and foreign researchers. The covered topics included all recent advances in operational research, including new methodological developments as well as applications and case studies in a wide range of fields, such as energy and the environment, management, logistics and supply chains, finance, transportation, public services, and health care.

This edited volume was prepared on the occasion of the above event. After a review process, 14 papers were selected for this book. The papers cover recent advances on a wide range of areas, adopting an applied perspective that covers the contributions of OR in the broad field of business and economics. The contents of the book can be (roughly) grouped into four main thematic areas.

The first group of papers covers topics related to the management of supply chains, organizational performance, and strategic management. The book starts with the paper by Panayiotou, Stavrou, and Gayialis who present an application of a business process modeling approach to design supply chain processes in the case of a SME manufacturing company. The second paper covers a similar topic. In particular, Nikolaou and Zervas examine the role of environmental

information in the decisions of managers/owners to adopt environmental practices into their supply chain management. In the third paper, Karampatsa, Grigoroudis, and Matsatsinis provide a literature overview of retail category management, focusing on methods and approaches for assortment and shelf space planning and other related topics. The next two papers cover issues related to organizational performance. First, Kitsios, Champipi, and Grigoroudis present the use of a multicriteria decision aid approach to develop a model for assessing the likelihood of success of new services in the cultural and creative industries. In the next paper, Mitroulis and Kitsios examine how differentiation and competitive innovation strategy affect organizational performance, both in financial and nonfinancial terms. The last paper of the first thematic area of the book, by Krasadaki and Matsatsinis, presents a decision aiding process for strategic management in the agricultural sector and its pilot implementation in farms operating in the island of Crete, Greece.

The second thematic area includes two papers about financial decision making. The first paper, by Nikolaidis, Doumpos, and Zopounidis, examines the predictive power of analytical models in behavioral credit scoring under population drift conditions due to a deteriorating macroeconomic environment. In the next paper, Karakalidis and Sifaleras present the implementation of a library of portfolio optimization models in the AMPL mathematical programming modeling language.

The third group consists of three papers that focus on the use of optimization approaches (metaheuristics and analytical methods) for production systems and logistics. In the first paper in this group, Boulas, Dounias, and Papadopoulos present the implementation of a genetic programming approach for analyzing serial production lines and extracting useful measurements and line characteristics. The next paper by Rogdakis, Marinaki, Marinakis, and Migdalas presents a new algorithm for the vehicle routing problem together with its application to a real case study. The paper by Baazaoui, Hanafi, and Kamoun deals with a real-world application of cutting mousse blocks proposed by an industrial company, based on a mixed-integer linear programming formulation, which is used to derive an upper bound for this complex optimization problem.

The book closes with three papers about inventory systems and energy systems planning. First Konstantas, Ioannidis, Grigoroudis, and Kouikoglou develop simple models for understanding how the dynamics of quality affect customer satisfaction and profitability in make-to-stock manufacturing systems, focusing on a Markovian, single-stage system facing random demand. In the next paper, Krommyda, Skouri, Konstantaras, and Ganas formulate optimal replenishment policies for an inventory model for seasonal products, taking into account the warehouse capacity and credit period options. The book closes with the paper by Kanellos, Prousalidis, and Tsekouras, who present a dynamic programming approach for optimal demand side management and power generation scheduling in all electric ships, subject to operation, environmental, and travel constraints.

Closing this short preface, we would like to express our sincere gratitude to all participants of the 4th International Symposium and 26th National Conference on Operational Research, who supported the event, and in particular to the authors who contributed with their papers to this volume. We should further thank all those who devoted considerable time to review the submitted papers.

Chania, Greece

Evangelos Grigoroudis
Michael Doumpos

Contents

List of Contributors

Mariem Baazaoui MODILS Laboratory, Faculty of Economics and Management of Sfax, University of Sfax, Sfax, Tunisia

Konstantinos Boulas Management and Decision Engineering Laboratory (MDE-Lab), Department of Financial and Management Engineering, Business School, University of the Aegean, Chios, Greece

Eleni Champipi Cultural Organizations Management, Hellenic Open University, Patra, Greece

Michael Doumpos Financial Engineering Laboratory, Technical University of Crete, Chania, Greece

Georgios Dounias Management and Decision Engineering Laboratory (MDE-Lab), Department of Financial and Management Engineering, Business School, University of the Aegean, Chios, Greece

Sotiris P. Gayialis Sector of Industrial Management and Operational Research, School of Mechanical Engineering, National Technical University of Athens, Zografos, Athens, Greece

Ioannis Ganas Department of Accounting, Technological Educational Institute of Epirus, Preveza, Greece

Evangelos Grigoroudis School of Production Engineering and Management, Technical University of Crete, Chania, Greece

Saïd Hanafi LAMIH Laboratory, University of Valenciennes and Hainaut-Cambrésis, Famars, France

Stratos Ioannidis School of Production Engineering and Management, Technical University of Crete, Chania, Greece

Hichem Kamoun MODILS Laboratory, Faculty of Economics and Management of Sfax, University of Sfax, Sfax, Tunisia

Fotis D. Kanellos School of Production Engineering and Management, Technical University of Crete, Chania, Greece

Alexis Karakalidis Department of Applied Informatics, School of Information Sciences, University of Macedonia, Thessaloniki, Greece

Marina Karampatsa Decision Support Systems Laboratory, Technical University of Crete, Chania, Greece

Fotis Kitsios Department of Applied Informatics, School of Information Sciences, University of Macedonia, Thessaloniki, Greece

Dimitrios Konstantas Financial Engineering Laboratory, Technical University of Crete, Chania, Greece

Ioannis Konstantaras Department of Business Administration, School of Business Administration, University of Macedonia, Thessaloniki, Greece

Vassilis S. Kouikoglou School of Production Engineering and Management, Technical University of Crete, Chania, Greece

Evangelia Krassadaki Decision Support Systems Laboratory, Technical University of Crete, Chania, Greece

Iris-Pandora Krommyda Department of Business Administration of Food and Agricultural Enterprises, University of Patras, Agrinio, Greece

Magdalene Marinaki School of Production Engineering and Management, Technical University of Crete, Chania, Greece

Yannis Marinakis School of Production Engineering and Management, Technical University of Crete, Chania, Greece

Nikolaos F. Matsatsinis Decision Support Systems Laboratory, Technical University of Crete, Chania, Greece

Athanasios Migdalas Department of Civil Engineering, Aristotle University of Thessaloniki, Thessaloniki, Greece

Department of Business Administration, Industrial Logistics, Technology and Social Sciences, Luleå University of Technology, Luleå, Sweden

Dimitrios Mitroulis Department of Applied Informatics, School of Information Sciences, University of Macedonia, Thessaloniki, Greece

Dimitris Nikolaidis Financial Engineering Laboratory, Technical University of Crete, Chania, Greece

Ioannis E. Nikolaou Department of Environmental Engineering, Democritus University of Thrace, Xanthi, Greece

Nikolaos A. Panayiotou Sector of Industrial Management and Operational Research, School of Mechanical Engineering, National Technical University of Athens, Zografos, Athens, Greece

Chrissoleon Papadopoulos Department of Economics, Aristotle University of Thessaloniki, Thessaloniki, Greece

John Prousalidis School of Naval Architecture and Marine Engineering, National Technical University of Athens, Zografos, Athens, Greece

Ioannis Rogdakis School of Production Engineering and Management, Technical University of Crete, Chania, Greece

Angelo Sifaleras Department of Applied Informatics, School of Information Sciences, University of Macedonia, Thessaloniki, Greece

Konstantina Skouri Department of Mathematics, University of Ioannina, Ioannina, Greece

Vasileios P. Stavrou Sector of Industrial Management and Operational Research, School of Mechanical Engineering, National Technical University of Athens, Zografos, Athens, Greece

George J. Tsekouras Department of Electrical Engineering and Computer Science, Hellenic Naval Academy, Piraeus (Hatzikiriakio), Greece

Anastasios Zervas Department of Environmental Engineering, Democritus University of Thrace, Xanthi, Greece

Constantin Zopounidis Financial Engineering Laboratory, Technical University of Crete, Chania, Greece

Audencia Business School, Nantes, France

The Application of a Business Process Modeling Architecture in the Supply Chain of a Manufacturing Company: A Case Study

Nikolaos A. Panayiotou, Vasileios P. Stavrou, and Sotiris P. Gayialis

Abstract Business process modeling is aimed at the design and documentation of business processes. Business process models are used to analyze processes, to reduce their complexity, to evaluate their performance and finally to assist business process improvement. In this light, a number of modeling architectures, methods and tools have been developed in order to assist scientists and practitioners to model and manage business processes. In addition, supply chain management importance is increasingly being recognized as it integrates and synchronizes business processes across the extended supply chains.

This paper deals with the application of a specific business process modeling architecture in order to design supply chain processes in the case of a SME manufacturing company. The modeling architecture has been developed in the context of the "Odysseus" research project, which deals with the management of demand variability in modern supply chains. The architecture covers different supply chain views such as processes and activities, organization, information systems, risk management and decision making. These views are covered by the modeling architecture using nine selected and interconnected ARIS methods. The architecture is applied in a Greek SME company producing electrical equipment. The production process of the equipment consists of in-house as well as sub-contracted phases performed by Greek and European manufacturers. The coordination of the related supply chain processes is performed by the company under discussion. Due to the extended degree of collaboration, the need for accurate planning, coordination and controlling in the supply chain is highly increased, making business process modeling an ideal enabling approach.

Keywords Business processes modeling • Architecture • ARIS methods • Case study • Manufacturing company • Subcontractors

N.A. Panayiotou • V.P. Stavrou (✉) • S.P. Gayialis
Sector of Industrial Management and Operational Research, School of Mechanical Engineering, National Technical University of Athens, Zografos, Athens, Greece
e-mail: vstavru@yahoo.gr

E. Grigoroudis, M. Doumpos (eds.), *Operational Research in Business and Economics*, Springer Proceedings in Business and Economics,
DOI 10.1007/978-3-319-33003-7_1