PREFACE

OR in digital production and logistics management

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This special issue of *Annals of Operations Research* collects some of the contributions on operations research in digital production and logistics management presented at the 10th International Conference of Production Research—Americas (ICPR–Americas 2020). This meeting was organized by the Americas chapter of the Conference series of the International Foundation for Production Research, that is devoted to operations research applied to the study of production, management, and logistics problems. The 2020 conference was held during the first year of the COVID–19 pandemic. Due to the restrictions imposed and the uncertainty of the situation, the conference was held in virtual mode, in accordance with the biannual calendar of the ICPR–Americas conferences in order to respect the mandate of providing a forum for young researchers and students to exchange ideas and experiences. This tradition has been followed since the inception of the ICPR–Americas conference series in 2002 (see the historic perspective presented by Velasco & Mejía, 2019).

In addition to a selection of papers extending works presented originally at ICPR–Americas 2020 this special issue also incorporates some new contributions. These 18 accepted papers present significant advances in the fields of production, supply chain, and logistics:

1 Production

Jose M. Framiñan, Paz Perez-Gonzalez, and Victor Fernandez-Viagas address, from a decision-making perspective, the impact of additive manufacturing on production processes and its consequent effect on supply chains. This work systematically describes the different transformations that this new way of producing causes in production systems, identifying the main challenges that still need to be addressed by the scientific community.

Wen-Hsien Tsai, Shang-Yu Lai, and Chu-Lun Hsieh discuss the potential financial impact of the carbon emissions from production processes. They illustrate this situation in the case of paper manufacturing companies, studying different strategies to take advantage of emission

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compensation mechanisms to help companies achieve sustainable competitiveness and, at the same time, obtain economic benefits.

Carolina Saavedra Sueldo, Ivo Perez Colo, Mariano De Paula, Sebastián A. Villar, and Gerardo G. Acosta study the use of discrete event simulation in decision-making for robotized smart manufacturing processes. This allows them to design and evaluate the impact of autonomous decision-making processes associated with the digital twin generated by the simulation of discrete events.

Alok Raj and Anand Jeyaraj discuss, in the Technology-Organization-Environment framework, different ways in which the development of decision-support systems may contribute to the effective digitalization of organizations. Analyzing some case studies, they conclude that their approach contributes to the digital transformation process, improving the associated investment processes.

Pourya Pourhejazy, Chen-Yang Cheng, Kuo-Ching Ying, and Nguyen Hoai Nam analyze the Distributed Two-Stage Assembly Flowshop Scheduling Problem with Mixed Setups. This problem represents an innovative and interesting extension of the distributed two-stage production-assembly scheduling family of problems. To solve it, the authors develop a novel iterated greedy algorithm, incorporating a Meta-Lamarckian approach.

Gabrijela Obradović, Ann-Brith Strömberg, and Kristian Lundberg propose a system-of-systems to coordinate the interactions between the operations system and the maintenance system, which are linked by contracts that regulate their activities. The authors develop mixed integer-linear programming (MILP) multi-objective models to analyze different contract policies.

2 Supply chain

Weihua Liu, Siyu Wang, and Jingkun Wang study the innovation processes that contribute to improving the competitiveness of smart supply chains. They collect the main indicators that describe the innovation pathways and apply TOPSIS to define the best strategy to reach a target level of innovation and competitiveness.

Mohammad Izadikhah and Reza Farzipoor Saen propose a new stochastic two-stage data envelopment analysis (DEA) model for assessing the sustainability of a supply chain. They analyze the welding electrodes supply chain as a case study, considering its economic, social, and environmental aspects.

Ipek Kazancoglu, Melisa Ozbiltekin-Pala, Sachin Kumar Mangla, Ajay Kumar, and Yigit Kazancoglu discuss the advantages of incorporating emerging technologies to improve the sustainability and resilience of supply chains. They study this problem in the context of the automotive industry during the COVID–19 pandemic. They point out that the sustainability and resilience of supply chains require, in particular, improving the traceability of products and the quality of the purchasing and the response-to-demand plans.

Abroon Qazi, Mecit Can Emre Simsekler, and Steven Formaneck study the supply chain risk management according to the Risk Network Value at Risk. To do so, they introduce new risk metrics and a new process, theoretically grounded in the Bayesian Belief Network and Monte Carlo Simulation frameworks. The paper presents an application to the solution of a real case study in the telecommunications industry.

Li-Hao Zhang, Cheng Zhang, and Jie Yang study different financial strategies and power channels to define the cost of the engagement of the manufacturer in a supply chain. The interaction of a manufacturer with a retailer under three power structures is studied in the

framework of a Bertrand model. The resulting equilibria yield different engagement strategies.

Mehdi Rajabi Asadabadi, Hadi Badri Ahmadi, Himanshu Gupta, and James J. H. Liou address the supplier selection problem in a context in which suppliers can help to improve the innovation for environmental sustainability (IES) level of decision makers. The authors analyze this decision problem in situations of uncertainty, presenting a multicriteria approach to solve it.

3 Logistics

Aghdas Badiee, Hamed Kalantari, and Chefi Triki study the problem of assigning shipments to drivers considering both the existence of collaboration between drivers and the dissemination of information. They propose a two-layer weighted driver collaboration network under different types of communication, and seeking the assignation that maximizes the economic benefit.

Maximiliano R. Bordón, Jorge M. Montagna, and Gabriela Corsano approach a problem of harvesting and transporting forestry products in an integrated way. For this, they propose MILP models minimizing the complete costs of the entire process. They also solve the problem under different bucking patterns.

Bismark Singh, Lena Oberfichtner, and Sergey Ivliev study the problem of transporting cash between banks, minimizing the risk of theft. The authors develop a set of heuristics to solve real-scale problems, comparing the solutions to those obtained with other methods.

Arthur Mahéo, Diego Gabriel Rossit, and Philip Kilby address an integrated problem of waste collection, considering both the location of waste accumulation points and the design of collection routes. To solve the problem the authors propose a method based on the Benders decomposition.

Simon Emde, Shohre Zehtabian, and Yann Disser study a diary transport planning problem considering multiple clients, a single warehouse and a heterogeneous fleet. The authors show that proving the feasibility of a route is a NP-hard problem. For its resolution they propose an algorithm using the Benders decomposition as well as an approach based on constraint programming.

Fatemeh Faghih-Mohammadi, Mohammad Mahdi Nasiri, and Dinçer Konur analyze the problem of emergency logistics operation, incorporating the concept of opportunistic cross-docking (sending items directly from incoming to outgoing vehicles whenever possible). To find the optimal logistics design, they use an approach based on the fix-and-relax method.

Reference

Velasco, N. M., & Mejía, G. (2019). Consolidating a research community on production research and logistics in Latin America. *Academia Revista Latinoamericana De Administración, 32*(2), 110–117. https://doi.org/10.1108/ARLA-06-2019-361

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