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Guest editorial

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This special issue of Decision Making in Manufacturing and Services is devoted to Game Theory and Applications and related topics. The origin of the issue is the 10th Spain-Italy-Netherlands Meeting on Game Theory (SING10), which took place from 7–9 July, 2014. The conference was hosted by the Faculty of Management at AGH University of Science and Technology in Kraków, Poland (the main organizer was Izabella Stach).

The history of the SING meetings started at the beginning of the 1980s, with the first meetings held in Italy. Then, meetings were subsequently added in Spain, the Netherlands, and Poland. Nowadays, SING is one of the most important international meetings on game theory organized each year in a European country.

The SING10 meeting in 2014 attracted more than 190 scientists from 5 continents. More about the SING meetings and, in particular, about SING10 can be funded in Gambarelli (2011) and Bertini *et al.* (2014).

The submitted papers (139 presentations, 135 in parallel sessions and 4 in plenary sessions) covered a variety of topics on game theory and its applications. This special issue collects some surveys on recent results in different fields, presented in the conference.

THE STRUCTURE

The first issue, "On Public Values and Power Indices" by Cesarino Bertini and Izabella Stach, analyzes some values and power indices well-defined in the social context, where the goods are public, from different point of view. In particular, they consider

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the Public Good index, the Public Good value, the Public Help index, the König and Bräuninger (or Zipke), and the Rae index. The authors propose an extension of the Public Help index to cooperative games, introduce a new power index with its extension to a game value, and provide some characterizations of the new index and values.

The second one, "Balancing Bilinearly Interfering Elements" by David Carf? and Gianfranco Gambarelli, starts from the consideration that many decisions in various fields of application have to take into account the joined effects of two elements that can interfere with each other. This happens, for example, in Medicine, Agriculture, Public Economics, Industrial Economics, Zootechnics, and so on. When it is necessary to decide about the dosage of such elements, there is sometimes a primary interest for one effect rather than another; more precisely, it may be of interest that the effects of an element are in a certain proportion with respect to the effects of the other. It may be also necessary to take into account minimum quantities that must be assigned. The authors present the solution in closed form for the case in which the function of the effects is bilinear.

The third paper, "Allocating Pooled Inventory According to Contributions and Entitlements" by Yigal Gerchak, considers inventory pooling. Inventory pooling is known to be beneficial when demands are uncertain. But when the retailers are independent, the question is how to divide the benefits of pooling. In particular, the author considers a decentralized inventory-pooling scheme where the retailers' entitlements to allocation depend on their contributions to the pool in case of shortage. Then, the author derives the Nash equilibrium, and specializes it to symmetric cases.

The fourth contribution, "On the Non-Symmetric Nash and Kalai–Smorodinsky Bargaining Solutions" again by Yigal Gerchak, refers that, in some negotiation application areas, the usual assumption that the negotiators are symmetric has been relaxed. In particular, weights have been introduced to the Nash Bargaining Solution to reflect the different powers of the players. In particular, the author analyzes the properties and optimization of the non-symmetric Nash Bargaining Solution and of a non-symmetric Kalai–Smorodinsky Bargaining Solution. Then, the author provides extensive comparative statics and comments on the implications of the concepts in supply-chain coordination contexts.

The following issue, "Interval methods for computing strong Nash equilibria of continuous games" by Bartłomiej Jacek Kubica and Adam Woźniak, considers the problem of seeking strong Nash equilibria of a continuous game. For some games, these points cannot be found analytically, but only numerically. Interval methods provide us with an approach to rigorously verify the existence of equilibria in certain points. A proper algorithm is presented. Parallelization of the algorithm is also considered, and numerical results are presented. As a particular example, the authors consider the game of "misanthropic individuals," a game that might have several strong Nash equilibria, depending on the number of players. Finally, an algorithm presented is able to localize and verify these equilibria.

The sixth paper by Andrzej Paliński presents a model of bank loan repayment as a signaling game with a set of discrete types of borrowers. The type of borrower is the return on investment project. A possibility of renegotiation of the loan agreement leads

to an equilibrium in which the borrower adjusts the repaid amount to the liquidation value of its assets from the bank's point of view. In the equilibrium there are numerous pooling equilibrium points with values rising according to the expected liquidation value of the loan. Furthermore, the author proposes a mechanism forcing the borrower to pay all of his return instead of the common liquidation value of subset of types of the borrower.

Last but not least is, the issue of Joanna Zwierzchowska, "Hyperbolicity of systems describing value functions in differential games which model duopoly problems". Based on the Bressan and Shen approach, the author presents the extension of the class of non-zero sum differential games for which value functions are described by a weakly hyperbolic Hamilton-Jacobi system. The considered value functions are determined by a Pareto optimality condition for instantaneous gain functions, for which we compare two methods of the unique choice Pareto optimal strategies. Then, the procedure of applying this approach for duopoly is presented.

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The guest editors

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