EDITORIAL

SYSTEMS AND OPERATIONAL RESEARCH FOR MODELLING AND DECISION MAKING. A PERSPECTIVE FROM *BOS* CONFERENCES

This is the first of a pair of editions devoted to articles presented at the BOS 2012 conference which was held in September 2012 in Warsaw, at Palais Staszic, the traditional seat of learned societies located in the capital of Poland, built exactly for this purpose at the beginning of the 19th century. The BOS conferences, devoted – hence the Polish acronym – to operations and systems research at large, have now more than two decades of history, having started in the late 1980s. These meetings nowadays constitute one of the major forums of the Polish community of specialists in the domain of systems and operations research, usually gathering about 100 participants from academia, R&D, administration, as well as business circles. Although it could hardly be said that BOS conferences encompass the whole of this community, they are definitely highly representative of what is going on in terms of the problems addressed, methods applied and results obtained.

The BOS conferences are one of the main activities of the Polish Operations and Systems Research Society (POSRS), now in existence for close to 30 years. These meetings are traditionally organised and run in collaboration with the Systems Research Institute of the Polish Academy of Sciences, and, in the majority of cases, also involve some third party – usually a university or a faculty of a university. POSRS, by the intermediary of the Association of Polish Operations Research Societies of which it is the leading member, participates in the activities of IFORS, the International Federation of Operations Research Societies, and its European chapter, EURO. In particular, one of the working groups of EURO, the MODEST (MODelling of Economies and Societies in Transition) group led by Zbigniew Nahorski and Jan W. Owsiński, is affiliated to POSRS.

In the case of the BOS 2012 conference, the publication of papers presented there follows a normal practice nowadays. Namely – an official CD was produced prior to the conference, containing all the accepted conference papers*. After the conference, fully-fledged papers were submitted to a number of Polish journals prepared after additional reviewing. OR&D is the journal to which the highest number of papers were submitted. Some of the articles from BOS 2012 have already been published in OR&D. The present two issues gather the articles which have gone through the same procedure. Again, it is, in my own opinion, quite a representative sample of the sort of studies discussed at BOS 2012. Having said this, though, I should note some absences: first and foremost in the OR context, is that of papers devoted to scheduling, task assignment, project planning and similar issues. Due to the very specific character of these problems, the papers on these subjects have been directed elsewhere. The same applies to papers concentrating on computer science-related problems, or problems linked with artificial intelligence, data and knowledge mining etc., as well as their respective applications.

What, therefore, is the content of the present issue?

We start the first issue with a paper by Hanna Bury and the late Dariusz Wagner, the second author having been a person well known in the Polish community of systems and operations research, who left us just before the BOS 2012 conference. This paper deals with *decision analysis* and *decision making methodologies*, the subject of studies by both authors for a long time, in which they have presented a number of original results, especially for multi-person, multi-item situations.

From this rather general, methodological paper, we pass on to a series of papers devoted to classical OR problems or their varieties, seen from the perspective of new formulations or methodologies, with an emphasis on practicability. So, the article by Katarzyna Jakowska-Suwalska considers a *multi-criteria model of economic order size*. Thus a classical OR problem is addressed in a quite practical setting, in which a number of aspects or criteria have to be accounted for, differing, in particular, with regard to their substantive and technical character.

The paper by Joanna Banaś and Karina Tomaszewska addresses the problem of *planning in a transport company*, again *in a multi-criteria setting*, with the application of fuzzy coefficients to represent uncertainty. Even though the task is not only quite classical, but also relatively simple in terms of dimensions and formulation, the analysis provides a nice insight into the capacities of the model proposed and the consequences of its application.

The subject matter of transportation is continued with a paper by Barbara Mażbic- -Kulma, Jan W. Owsiński, Jarosław Stańczak and Krzysztof Sęp. Here, a transforma-

---

*Proceedings of the 12th Conference of the Polish Society of Operation and Systems Research BOS 2012, Warsaw 17–19.09.2012, Polish Society of Operation and Systems Research and Systems Research Institute of the Polish Academy of Sciences, Warsaw 2013.

tion of the graph of *transport connections* to some other form (*hub-and-spoke*, *kernel-and-shell*) is proposed, which enables more effective and efficient functioning of the actual transportation system, based on the graph of connections. In this context, the notion of an *α-clique in a graph* is made use of, and a specialised *genetic algorithm* is applied to find solutions.

With the next article we stay in the general domain of transport, but perceived from the standpoint of its environmental impact. Thus, Małgorzata Łatuszyńska and Roma Strulak-Wójcikiewicz propose an elaborate model for the *EIA of transport-related investment projects*, including, in particular, a simulation tool, incorporating a number of different methodologies used to produce the EIA.

The next paper, by Andrzej Kałuszko, marks a smooth passage within the environmental domain towards aspects associated with energy generation. Namely, a method of *optimising means allocation for minimising CO_2 emissions from a set of power plants* with different characteristics is presented. This method refers to the principles of *dynamic programming*, and its use is shown based on the concrete case of the 20 largest Polish coal-fired power plants. It should be underlined that this subject carries a very heavy political, as well as economic, weight in the perspective of CO_2 emissions allowances and permit trading, as well as European policies, and socio-political responses from the Polish – and other – sides.

The very intensively studied nexus of energy-and-the environment also returns as the subject of an article by Jacek Malinowski. This article, again, deals with a very fundamental issue for environmental concerns – that of the *temporal variability of renewable energy sources*. This variability largely results from the vagaries of the weather, climate, bio-systems etc., and makes the use of these sources, as well as the associated planning and management, quite complex. This paper introduces a methodology based on *semi-Markovian processes*, leading to the determination of key parameters of the appropriate processes. With this paper we close the first special issue devoted to the BOS 2012 conference.

And so, at the beginning of the second issue, we enter, once more, the methodological domain, here meaning advanced applications of methods developed for "other" or "general" purposes. However, the methodological developments in the two papers opening the second issue, the first by Jan Gadomski, and the second by Jan Gadomski and Piotr Nowak, are indeed of a truly novel character. They refer to what are called *distributed lag models*, and their application, or rather analysis, in *economic systems and processes*. Given the recent occurrences in the world and regional economies, one can easily reach the conclusion that economic science and methodology still needs a lot of development on quite fundamental issues. Thus, it is no wonder that models are being developed that try to grasp diffuse influences – here over time – that may have an impact on some current situations. Indeed, these two papers present both novel and important contributions from this point of view, and constitute a valuable introduction to the modelling of distributed lag processes, especially in economics.

Methodology for the modelling of economic structures and processes also constitutes the subject matter of the paper by Mateusz Zawisza and Bogumił Kamiński. The paper analyses an *oligopolistic situation* with *switching costs* and with *uncertainty as to demand*, under variable conditions that may affect the price setting process. The influence of switching costs on the price-related behaviour of companies is definitely of primary interest. The simulations carried out by the authors provide quite ample material for interpretations, showing, e.g., the optimum behaviour of companies in terms of maintaining customer loyalty and attracting new customers.

This is followed by a paper by Lech Kruś, Jan Skorupiński and Eugeniusz Toczyłowski, entitled *Analysis of incentive compatible decisions in a multicriteria auction*, which is devoted to the analysis of quite a specific decision-making situation and its properties. It suits this particular place in this pair of journal issues, because it corresponds to a situation that is more plausible for in-market decisions, made through – say – online auctions than for the circumstances that were described in the paper by Hanna Bury and Dariusz Wagner.

We close this second issue with two papers that represent a much less formal approach to two important socio-economic problems, which are particularly acute in the modern developed economies and societies. These are: *public procurement* and the *interplay of* (potentially *conflicting*) *doctrinal, political and power-related interests*, considered against the background of European Union regulations, discussed in the article by Helena Lindskog, Staffan Brege and Per-Olof Brehmer, and the "productive" aspect of the *education process*, modelled according to the concept of a *Virtual Production* (or: Assembly) *Line*, first introduced mainly for the purposes of designing production processes in the automotive industries, and then developed for the purposes of *analyzing and modelling educational processes* by Stanisław Walukiewicz. Here together with Aneta Wiktorzak, he presents this concept, and its consequences. Both of these closing papers actually deal with the broader category of human capital, or social capital, understood as the potential, or capacity, of a human system that relies at the same time on what is represented by the individuals concerned (skills, education, soft capabilities, etc.) and what can be said about and inferred from their interactions (between group and individual interests, lobbying capacities, time horizons of objectives, etc.).

In this way we have spanned quite a range of approaches – from strictly formal ones to such that use formalisation in just a metaphorical manner, and a range of subject matter – from decision making in general through classical transport-related problems, the environment and energy, general economics to public procurement and education. Is this not a representative sample?

We think that indeed it is and we hope that these two issues of OR & D bring to you an appreciation of what is going on in various Polish academic and research centres in the fields of systems and operations research – with the reservations made explicit above – and what are the capabilities of researchers in this field. Let me express

this hope on behalf of all those who contributed to the success of the BOS 2012 conference by organizing it, delivering lectures or taking part in the lively discussions during its sessions. And, please, forgive me for not naming all those who made this event possible and so memorable to its participants.

And, indeed, I attach a cordial invitation to BOS 2014, to take place, as well, in Warsaw's Palais Staszic, in the second half of September 2014. Be certain that this meeting shall be – as usual – a warm and intellectually stimulating event.

Jan W. Owsiński
Secretary General of the Polish Operational and Systems Research Society