



## Editorial for the special issue: “Novel solutions or novel approaches in Operational Research”

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### Abstract

The special issue of Business Systems Research (SI of BSR) is co-published by the Slovenian Society INFORMATIKA – Section for Operational Research (SSI – SOR) and contains developments and new techniques in operations research (OR) models and their practical uses in various fields of business and economics. Seven papers that investigate developments and new techniques in operations research (OR) models and their practical uses in various fields of business and economics have been selected for this SI of BSR.

**Keywords:** interdisciplinary research, operations research, intramax procedure, prediction models, emergy analysis, multivariate analysis, data envelopment analysis

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### Editorial process

Applications of OR are abundant such as in business engineering and management, economics, manufacturing companies, government, health service, transportation systems, geographic information systems, scheduling, marketing, inventory, environment, to name a few (Cochran et al., 2011). Seven papers that consider developments and new techniques in OR models and their practical uses in various fields of business and economics were selected for this special issue of BSR.

The International Federation of Operational Research Societies (IFORS) and the Association of European Operational Research Societies (EURO) are an umbrella organizations for operational research societies worldwide representing approximately 50 national societies including also Slovenian Society INFORMATIKA - Section for Operational Research (SSI-SOR). The most important events organized by SSI-SOR are the international symposia. The 13th International Symposium on Operations Research, called SOR'15, was held in Bled, Slovenia, in September 23 - 25,

2015. SOR'15 was the scientific event in the area of operations research, another one in the traditional series of the biannual international OR conferences, organized in Slovenia by SSI-SOR. The main objective of SOR'15 was to advance knowledge, interest and education in OR in Slovenia, in Europe and worldwide in order to build the intellectual and social capital that are essential in maintaining the identity of OR, especially at a time when interdisciplinary collaboration is proclaimed as significantly important in resolving problems facing the current challenging times. Further, the SSI-SOR agreed to work together with diverse disciplines, i.e. to balance the depth of theoretical knowledge in OR and the understanding of theory, methods and problems in other areas within and beyond OR. SOR'15 was attended by approximately 200 participants, coming from research institutes, universities, governmental institutions, private and public companies all over the world. Ninety-three papers were presented, written by 191 authors and co-authors. The papers were accepted after a blindly review process of two independent reviewers selected from the SOR'15 Program Committee and reviewers appointed by SSI-SOR.

At SOR'15 was agreed to publish special issue (SI) of BSR and the call for papers for this SI of BSR was launched during this symposium at Bled in September 2015. The call was directed to the participants of SOR'15 as well as to other researchers from the field of OR. The submitted papers should present developments and new techniques in OR methods/models and their practical uses in business, economics, finance, organization, management, social sciences, environment, transport and other areas. Several papers have been received, some of them being extended journal version of short SOR'15 papers from proceedings (Zadnik Stirn et al., 2015). Each submission for SI of BSR was first reviewed by guest editors, and then blind reviewed by two independent experts.

The success of the SI of BSR should be seen as a result of joint effort. The guest editors would like to express the sincere thanks to the authors for their well written contributions and to the reviewers for their careful evaluation of submissions and their thoughtful and constructive comments. Last, but not least the guest editors express deep appreciation and thanks to the Editor-in-Chief, Professor Mirjana Pejić 'Bach, PhD for her generosity, service and commitment to invite us as guest editors of SI of BSR.

## Contributions

According to the goals and editorial policy of BSR the papers published in BSR should present original theoretical and empirical advances of business and economic systems using a wide range of methodological approaches, above all those from the field of operations research/analytics and statistics. The seven papers accepted for this SI of BSR perform these objectives.

Drobne and Lakner in the first paper present as novelty the simultaneous inclusion of three constraints (contiguity constraint, maximum-share-of-intra-regional-flows constraint and minimum-coefficient-of-variation constraint) in Intramax procedure. Intramax is a hierarchical aggregation procedure used as a functional regionalization method and without any constraints gives balanced hierarchical sets of functional regions without any singletons and isolated regions. Further, Intramax is a heuristic method which analysis interaction flows, like commuting flows, within and between a set of areas, and maximizes the proportion within the group interaction at each stage. The use of higher-inner-flows constraint gives singleton regions, the use of lower-variation constraint forces the units with the highest population of flows as isolated regions and up to a relatively small number of big functional regions.

In the second paper, Jeger, Bilandžić, and Šarlija explore the relations between

the variables/factors that influence firm growth within growth prediction models and study how to increase the interpretability of the logistic regression model especially when dealing with highly correlated variables. They expose the use of factor analysis to increase the interpretability of the logistic regression model by identifying most important factors, reducing large number of variables and lowering multicollinearity levels. The performed case study showed that the combination of factor analysis and logistic regression displays more clear interpretation of influence of variables on predicting growth.

Kocjančič, Žgajnar and Juvančič in the third paper employ emergy analysis, which is based on environmental accounting approach, and supports the idea that the natural capital invested in the production of goods and services determines their real value. The novelty aspect of this paper is the introduction of emergy indicators into standard multiple criteria optimization model based on linear programming. In the case study, the model investigates different alternatives to the milk production sector's re-organization. The results suggest considerable restructuring of the sector. It is shown that further expansion of organic production systems as a result of a stronger environmental focus in farm management can improve the sector socio-economic and emergy perspective. Moreover, even pursuing certain socio-economic targets may improve the sector's biophysical performance and lower pressure on local environment.

Fourth paper is written by Krpan and Vrankić, and authors illustrate how to apply principles of duality in monopolistic case where the single producer has an influence on the price which he charges for its product. Thus, the duality in microeconomic theory is transformed from the price taking behavior of economic subject on monopolistic behavior. The profit function for monopolist is derived from the production function and pseudo production function accompanied by pseudo cost function and adjusted Hotelling's lemma. Further, by introducing the pseudo production function in the profit maximization model of a monopolist, the structure of the problem becomes similar to the perfectly competitive case. This mean, that after the profit function is derived from the pseudo production and the pseudo cost function, all starting functions are recovered back from derived profit function.

Melecký and Hančlová in the fifth paper use a modified nonparametric Data Envelopment Analysis (DEA), namely meta-frontier approach with undesirable outputs to evaluate the efficiency of EU-28 NUTS 2 regions production process according to the concept of the Regional Competitiveness Index 2013. DEA, assuming a constant return to scale, is used in two steps. Firstly, to the authors provide group-frontier and secondly meta-frontier. Finally, they provide technology gap ratios to measure the gap between both frontiers, and show that a significant improvement of meta-technology ratio holds within the European context.

Škrinjarić and Šego in the sixth paper who discuss the problem of investors who seek to earn great returns while minimizing risks. They show how efficiently Multivariate Generalized Autoregressive Conditional Heteroskedasticity (MGARCH) methodology can be used to model changing risk and return dynamics on a daily basis on financial markets. MGARCH is used on stock market index CROBEX, bond market index CROBIS and exchange rate Kuna/Euro while the co-movements of returns and risks on a daily basis are taken into account. Results indicate that using MGARCH model when forming and rebalancing portfolio contributes to less portfolio volatility and greater cumulated returns compared to strategies which do not take this methodology into account.

Seventh paper written by Žmuk paper is focused on intracluster homogeneity in cluster sampling. The author assumed that data collection and above all intracluster

homogeneity have an important role in cluster design. In order to answer the question to what extent are the survey costs influenced by different homogeneity, random sampling and two-stage cluster sampling model was designed. The research shows that lower survey costs are achieved when the intracluster homogeneity is lower. The best results are achieved with average intracluster homogeneity value. This means, that when lowering the survey costs great importance has to be put on optimization of homogeneity in and between clusters.

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Guest Editors of SI of BSR

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