

Preface: fuzzy approaches in production research and information management*part-2*

Issue 4 in Volume 32 of *JEIM* was the first part of the special issue on fuzzy approaches in production research and information management. In this second part of the special issue, we present recent theoretical developments and real-world applications in the field of fuzzy systems for production research. Most papers in this part have been selected from the 16th Production Research Symposium that took place on October 12–14, 2016, in Istanbul, Turkey. All articles have been peer-reviewed by expert reviewers according to the journal's standards.

The first paper proposes a two-phase methodology to select a new bread factory location in Istanbul. Every district of Istanbul is considered to be a suitable candidate for bread production. In the first phase, the authors use GIS for bread sales. They create bread sales density maps for each district in Istanbul. In the last phase, they recommend using an interval type-2 hesitant fuzzy-based MCDM method to analyze these four alternatives in detail.

The second paper develops interval type-2 fuzzy X-R control charts; type-2 fuzzy control limits are obtained and the control charts are graphically illustrated and interpreted. The data consist of 20 subgroups taken over periodic times from the production process of a packaged food.

The third paper applies Shingo's single-minute exchange of die (SMED) methodology to the parts processed on a CNC machine where set-up time is reduced from 196 min to 87 min. A gain of 109 min or 55.61 percent is achieved and demonstrated an improvement in efficiency. However, there is a set-up activity that cannot be shortened with conventional SMED tools.

The fourth paper integrates a number of problem-specific heuristics with fix-and-optimize (FOPT) heuristic and tests their performances on different sizes of problems. The results of experiments show that utilizing problem-specific information improves the effectiveness of FOPT heuristic.

The fifth paper presents a structural competency model and remarks new personnel selection criteria. It presents an importance order and a causal relationship between personnel selection criteria by using one of the multi-criteria decision technique, Fuzzy DEMATEL, in a Turkish high-technology firm which has started to modify its processes according to Industry 4.0 and introduced a new department that is responsible for this transformation.

The sixth paper develops a hybrid algorithm that is the sequential use of the revised weighted fuzzy c-means clustering developed by Esnaf and Küçükdeniz (2013) and proposes derivative-free Nelder–Mead simplex algorithm. The proposed hybrid algorithm is applied to the generalized multisource Weber problem. The paper applies fuzzy C-means and Nelder–Mead algorithms to this type of Weber problems.

The seventh paper introduces a common time window to hybrid flow shop with multiprocessor task. A memetic algorithm (MA) is developed to provide good solutions to the problem. As the probability of finding quality solutions with MA relies upon the parameter choices such as crossover rate, mutation rate, population size, iteration size and parent selection rate, the full factorial design is implemented to decide the best parameter set for each problem type.

The eighth paper applies gray forecasting technique in healthcare sector. Small data are used for forecasting the demand on health sector with GM(1,1) and TFGM(1,1). It aims at indicating the accuracy of forecasting performance with gray model integrated triangular fuzzy numbers.



The ninth paper develops a new warehouse location selection model to contribute to the efficiency of the distribution network and to minimize their costs. Multi-criteria decision-making techniques help to choose the best alternative under multiple criteria are used to carry out the decision-making process.

We hope that this issue will provide a useful resource for ideas, techniques, and methods for fuzzy production research area. We are grateful to the referees whose valuable and highly appreciated works contributed to selecting the high-quality articles published in this issue. We are also very thankful to the Editor-in-Chief, Professor Zahir Irani, for his patience, support and efforts during the whole process.

Cengiz Kahraman

Istanbul Teknik Universitesi, Istanbul, Turkey, and

Ferhan Çebi

Faculty of Management, Istanbul Technical University, Istanbul, Turkey