Editorial for the Special issue on Multiple Criteria Decision Making models

Emel Aktas, Cranfield University, Cranfield School of Management, College Road, Cranfield, MK43 0AL, UK.

Y Ilker Topcu, Istanbul Technical University, Industrial Engineering Department, Macka, Istanbul, Turkey.

Berk Kucukaltan, Trakya University, Faculty of Applied Sciences, Edirne, Turkey.

This special issue idea came to life with Prof Ilker Topcu hosting the 25th International Conference on Multiple Criteria Decision Making in Istanbul from 16 to 21 June 2019 (https://mcdm2019.org/about/). International Society on Multiple Criteria Decision Making (MCDM) brings together academicians, professionals, researchers, students and policy-makers at a bi-annual conference since 1975. MCDM 2019, one of those conferences, gathered 261 participants from 5 continents and 39 countries. The modern world is experiencing a shift from a production-focused age to the information-focused age. As the organisers of the conference believe that the information age will be followed by a decision age where Multiple Criteria Decision Making (MCDM) will play a crucial role in using information and communication technology for making better decisions, they announced the theme of the conference as "MCDM beyond the information age" and also prepared the call for this special issue, inviting researchers across the world to submit their work supporting decision making with multiple criteria methods.

Multiple criteria decision making models incorporate concerns about multiple conflicting criteria into the management planning processes covering a wide variety of topics. With a vast domain of applications, multiple criteria decision models are increasingly used for supply chain decision making. This special issue covers decision making studies on quality in manufacturing, sustainability in supply chains, location selection, and employee selection.

We open the special issue with two papers on automotive manufacturers. Altinisik et al. (2020) present a decision support system for proactive failure prevention in an automotive company. Automotive products have become increasingly complex and the decision support system estimates risk scores for workstations using multiple attributes. Based on Analytic Network Process, the decision model brings together design-driven factors, process-driven factors, and human-focused factors to produce a risk index for each workstation. We expect this application to inform other similar applications of risk prevention in complex manufacturing environments.

Next, Singh et al. (2020) present a three-phase framework for manufacturers to identify the reasons for consumer dissatisfaction and inform subsequent corrective actions. Having

demonstrated the application of the framework on a large data set of 36K reviews from carwale.com, the authors provide a root-cause analysis of weak performance as perceived by the users of the products.

Shifting the focus to sustainability, Calik (2020) introduces a hybrid approach for supplier selection, incorporating sustainability criteria into the process. This three-stage hybrid approach starts with identifying main and subcriteria, constructing a hierarchical structure, and prioritising the criteria using Fuzzy Analytical Hierarchy Process in the second stage. Finally the third stage comprises assigning orders to suppliers depending on suppliers' capabilities.

Sustainable supply chain management is a well-researched area, with growing application domains. Hashim et al. (2020) draw our attention to knowledge management adoption within sustainable supply chains in the food sector. Using Fuzzy Analytical Hierarchy Process, the authors identify and prioritise managerial, governmental, organisational, technological, socio-economic, and soft-skills related barriers to adopting knowledge management practices within a sustainable food supply chain.

Following on, Kumar and Ramesh (2020) focus on the freight transport sector sustainability. For this purpose, they identify internal and external social sustainability practices, stakeholder participation in sustainability activities and macro-social performance. Using the fuzzy best worst method, the authors conclude that freight transport organisations should prioritise internal social sustainability indicators to improve their overall social sustainability performance.

The sixth paper addresses the well-recognised hub location problem with a novel methodology based on Weighted Aggregated Sum Product Assessment (WASPAS) and Multi-Objective Optimization by Ratio Analysis (MULTIMOORA). Both techniques are gaining popularity in various applications and Aydin and Seker (2020) present their application for the hub airport selection problem of a low cost carrier.

The special issue ends with the paper by Dwivedi et al. (2020) on selecting employees from a talent pool, presenting the readers a vast range of applications of multiple criteria decision making methods. Dwivedi et al. (2020) identified different criteria for different job roles (eg transport manager, sales executive, warehouse executive) and demonstrated the application of Analytical Hierarchy Process on forming a team for a new business entering the cold chain market.

As can be seen from these accepted papers, there is a growing attention in addressing daily life challenges that humankind faces through the use of multiple criteria decision making models. Due to the dynamic nature of the external environment, there is always a need of constantly updating these models by incorporating soft and hard measures. Especially as a consequence of the non-ignorable impact of Industry 4.0 applications and technologies on both for-profit and not-for-profit organisations, we observe a rapid transition towards implementing digital decision models. In such changes, other external factors, such as the COVID-19 outbreak, also play a key role for all parties. In line with these, it is worthy of noting that the future of multiple criteria decision making models and techniques will be dealing with these issues in order to address the needs at all levels.

We hope you will enjoy this special issue on multiple criteria decision making applications and apply the methods to support your own decision problems.

Emel Aktas, Ilker Topcu, Berk Kucukaltan
May 2020, Cranfield, Istanbul, Edirne