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## Article

# Introduction to the special issue on integration of human factors and ergonomics

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## Introduction to the special issue on integration of human factors and ergonomics

Being primarily focused on operations management, the fields of transportation and logistics have for so long undervalued or neglected the role of human factors and ergonomics in their environments. The last ten years have seen the birth of Industry 4.0 with a focus on digitalization and artificial intelligence-based technologies to improve the efficiency and flexibility of supply chains. Interest in societal and environmental aspects is nowadays pushed in the front of the scene jointly with the economic aspect. More sharply in this direction, the new concept of Industry 5.0 aims at moving toward a resilient, sustainable, and human-centered industry. Operational Research and Artificial Intelligence can make a valuable contribution to help in reaching the objectives of Industry 5.0 through the development of new mathematical models and solution techniques to integrate human aspects and sustainability into the management of related operations together with economic performance criteria.

Since the early 2000s, growing attention is paid to ecological and societal concerns in the Operations Research discipline. However, several research gaps need to be filled. This special issue presents innovative research and new achievements dealing with the integration of human aspects in logistics and transportation.

In total, five papers were submitted to this special issue. We have selected two original contributions, which represent an acceptance rate of 40%. The selected articles address two main concerns frequently encountered in transportation and logistics, namely working time constraints and staff scheduling.

Sartori, Smet, and Vanden Berghe address a truck driver scheduling problem under working time constraints for single-day journeys. The authors introduce properties of truck driver schedules under working time constraints for single-day journeys. They develop a two-stage algorithm that exploits these properties to quickly produce schedules for a large number of truck routes. The algorithm minimizes the latest completion time of multiple truck schedules while ensuring that all drivers can complete their routes with sufficient recovery periods and within their working hours. The proposed approach outperforms the

current state-of-the-art, that is a label propagation algorithm, and a mixed-integer linear program solved by an optimization solver.

Hernández-Romero, Josefsson, Lemetti, Polishchuk, and Schmidt study the impact of various weather phenomena on Air Traffic Controller (ATCO) taskload through structured interviews with ATCOs. The authors deduce taskload-driven impact factors and the corresponding thresholds for the intensity of the weather phenomena at several Swedish airports. To account for the uncertainty in weather prediction, they obtain probabilistic weather data from ensemble prediction systems. Then they adjust their prior mixed integer programming model for Remote Tower Centers (RTC) staff scheduling to account for uncertain impactful weather occurrences and yield a probability distribution of the necessary number of ATCOs for RTC staff scheduling. The proposed framework can be used for conventional towers as well.

This special issue is the result of the work of several people. We acknowledge the efforts and time of all the reviewers who helped us to evaluate the submissions. We also thank Dominique Feillet, the Editor-in-Chief of EJTL, for giving us the opportunity to prepare this special issue.

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