ERCIM "ALAIN BENSOUSSAN"
FELLOWSHIP PROGRAMME

ERCIM
European Research Consortium
for Informatics and Mathematics

Scientific Report

First name / Family name	Bekir Sahin
Nationality	Turkey
Name of the *Host Organisation*	Norwegian University of Science and Technology (NTNU)
First Name / family name of the *Scientific Coordinator*	Assoc. Prof. Dr. Ahmet Soylu
Period of the fellowship	01/08/2019 to 25/07/2020

I. SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

During the ERCIM fellowship period, optimization algorithms and several pre-determined problems regarding to maritime supply chain and shipping industry are discussed under various multi-disciplinary considerations for this research programme. The research that I have completed can be briefly summarized as follows.

- Sustainable maritime supply chain design is investigated and a multi-layer, multi-segment iterative optimization algorithm is developed for maritime supply chain operations in a dynamic fuzzy environment. The main characteristics and core benefit of this algorithm is the provision of flexibility to the supply chain systems.

- A hybrid improved fuzzy AHP extended game-theoretic model is created for the risk assessment of ship investment based on shipyard strategies. The model brings a different perspective to the investment phenomena by proposing four novelties.

- Four novel models are generated for the intuitionistic fuzzy ANP models. Process management of the maritime supply chain is analysed by executing all methods proposed in the research to compare the results.

- Ship selection problem is studied, and a decision support system is developed. A fuzzy TOPSIS multi criteria decision analysis algorithm is implemented for the dry bulk carrier selection.

- Safety concerns for the shipping industry are studied based on two complicated factors: (i) Analysis of root causes for maritime accidents originated from human factor (ii) Technical Factor in Maritime Accidents: An Index for Systematic Failure Analysis

- An algorithm for optimal ship navigation is developed based on image processing.

- Impacts of COVID-19 to the shipping industry is investigated and a comprehensive literature review is conducted for the publication.

II. PUBLICATIONS DURING YOUR FELLOWSHIP

1- Sahin, B., Yip, T. L., Tseng, P. H., Kabak, M., & Soylu, A. (2020). An Application of a Fuzzy TOPSIS Multi-Criteria Decision Analysis Algorithm for Dry Bulk Carrier Selection. Information, 11(5), 251.

2- Yazir, D. Sahin, B., (2020). A Comparative Analysis for Selecting Possible Logistics Base Locations in Turkey, Dokuz Eylul University Faculty of Engineering Journal of Science and Engineering, (Accepted).

3- Sahin, B., Soylu, A., (2020). Intuitionistic Fuzzy Analytical Network Process Models for Maritime Supply Chain, Applied Soft Computing, (Submitted)

4- Sahin, B., Yazir, D., Soylu, A., (2020). Using a Hybrid Improved Fuzzy AHP Extended Game-theoretic Model for the Risk Assessment of Ship Investment based on Shipyard Strategies, Ocean Engineering, (Submitted).

5- Sahin, B., Soylu, A., (2020). Multi-Layer, Multi-Segment Iterative Optimization for Maritime Supply Chain Operations in a Dynamic Fuzzy Environment, IEEE Access, (Submitted).

6- Yazir D., Yip, T.L., Sahin, B., (2020). A novel model of fuzzy extension, group decision making and expert prioritization for EVAMIX method: An application of ship selection, The Asian Journal of Shipping and Logistics, (Submitted).

7- Sahin, B., Soylu, A., (2020). An Automatic Anomaly Detection System (AADS) for fully autonomous ships. ERCIM NEWS, 122.

III. ATTENDED SEMINARS, WORKSHOPS, CONFERENCES

1- Sahin, B., Yip, T.L., (2020), Analysis of root causes for maritime accidents originated from human factor, IAME 2020 Conference, Hong Kong, 10-13 June 2020

2- Sahin, B., Yip, T.L., (2020), Technical Factor in Maritime Accidents: An Index for Systematic Failure Analysis, IAME 2020 Conference, Hong Kong, 10-13 June 2020

3- Sahin, B., Soylu, A., (2020), Optimal ship navigation by image processing, The International Symposium on Visual Computing (ISVC), 5-7 October 2020. (Submitted).

IV. RESEARCH EXCHANGE PROGRAMME (REP)

I planned and organized everything to visit the Simula Research Laboratory, Norway. I contacted to Dr. Simon Wolfgang Funke, Head of Department, Research Director of Scientific Computing. Due to CoronaVirus (COVID-19) pandemic, Simula was totally empty for a time, and there was nobody at the Simula during my visit time. Our plans have totally changed, and a physical meeting could not be realised. However, I joined an online meeting at the Simula. Tens of researchers discussed regarding an app which its info is confidential. It was a good experience for me to see how a huge-project algorithm is developed under a well-planned collaboration. We also made several online meetings and discussed risk assessment concept and a risk analysis algorithm. I present a fuzzy fault tree analysis algorithm and discussed whether further subjects to be studied.