



PROJECT ACRONYM AND TITLE: Application of energy-efficient metaheuristics to optimisation problems in maritime container transport (E-MOTION)

FUNDING PROGRAMME: Call for funding of Institutional research projects of the University of Rijeka financed from source 581 – Recovery and Resilience Mechanism (University of Rijeka, Institutional Research Projects)

PERSON RESPONSIBLE: Marko Gulić

Project total cost	14.378,85 EUR
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SUMMARY AND OBJECTIVE: Maritime container transport is crucial for global trade, but it faces a number of optimization challenges. In this context, digital transformation and advanced optimization techniques have become essential for overcoming these challenges. This project focuses on increasing the energy efficiency of metaheuristic algorithms that will be used to optimize logistics problems in container transport, with particular emphasis on the role of pseudo-random number generators in these algorithms. The pseudo-random number generator is crucial for the successful application of metaheuristic algorithms as it significantly impacts the behaviour, efficiency, and quality of solutions. Although its role is often overlooked, selecting the right generator can significantly reduce energy consumption while improving optimization performance. Within this project, energy-efficient metaheuristics will be developed and applied, which not only enable the finding of high-quality solutions for specific logistics problems but also reduce energy consumption during the optimization process without compromising solution quality. These energy-efficient algorithms will be applied to specific logistics challenges in the maritime sector, such as berth allocation, quay crane assignment, container placement at terminals and on ships, and determining the optimal ship size for transport on a given route. With the goal of optimizing all stages of container transport, these algorithms improve efficiency, reduce costs and resource consumption, and contribute to sustainability. The project will evaluate the proposed solutions with an emphasis on analysing the energy efficiency of metaheuristics and their success in solving specific logistics problems. A significant advantage of this research is its broader applicability. These algorithms can be used for various optimization problems in the real world across different industries, enabling more energy-efficient and sustainable solutions beyond the maritime sector.

Start date	End date
1 October 2025	30 September 2029

PROJECT TEAM

No.	Member	Affiliation	Role
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