Executive Summary

As the maritime industry scales up and seeks greater efficiency and optimised operations, a key factor determining success or failure in implementation is the end user. This necessitates that shipping seek ways in which to accelerate the technological development, realization, and adoption of AI-powered ship operation support technology by ship crew and management.

With these considerations in mind and funded by the Swedish Transport Administration (Trafikverket), Yara Marine Technologies (YMT) co-ordinated and led The Via Kaizen project, with the goal of exploring the manner in which ship operators can improve energy-efficient voyage planning based on artificial intelligence and machine learning. The project was conducted in co-operation with industry partners like Molfow and DNV, as well as academic institutions such as Chalmers University, Halmstad University and the University of Gothenburg.

An AI-based, semi-autonomous voyage planning system was developed and trialled on two vessels: a car carrier operated by United European Car Carriers (UECC); and a Stenersen product tanker.

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The project used pre-existing tools, namely Yara Marine’s propulsion optimization system FuelOpt™ and performance management and reporting tool Fleet Analytics™, as well as Molflow’s vessel modelling system Slipstream, in order enable a higher degree of digitalization and automation in vessel operations.

To ensure that the technology was streamlined to best support processes and decisions that have the greatest impact on energy efficiency, existing work practices and user needs were analysed and considered during the design parameters.

The results yielded significant information regarding data handling, model development, crew training and corporate processes that can either facilitate or hinder the effective use of AI tools to improve efficiency. For ship operators, key takeaways include:

- Incorporating machine-learning algorithms for improved predictive modelling of ship propulsion power can lead to more accurate performance forecasting and optimization.
- Tools must support the existing operation and responsibilities of the crew. Integration of the onboard optimization system with crew workflows is essential to avoid obstacles.
- Constructive collaboration, between technology developers and users as well as between ship operators and their customers, is needed to build a successful use case.

The project has led to new knowledge about needs of shipping stakeholders and concrete areas of use for digitization and AI. The wide-ranging results indicated successful energy efficiency optimization based on estimated time of arrival (ETA), with one of the two trial vessels opting to continue using the system.

Critically, the concept deployed to optimize voyage planning and energy efficiency in this project is not constrained to the technologies used here. On this basis, the information gathered as part of the Via Kaizen project can be implemented widely to assist the shipping industry on its journey towards decarbonisation, contributing to a cleaner, greener planet for future generations.

Further funding has been secured from Swedish innovation agency Vinnova for continued research in this area.

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