

## ABSTRACT

This study aims to optimize risk management and operational efficiency in the self-propelled oil barge operations at PT Faher Hayat Bersatu. The primary issues faced by the company include high operational costs and unstructured risk documentation. To address these challenges, the research adopts an integrated approach using the Analytic Hierarchy Process (AHP) and Failure Mode and Effect Analysis (FMEA) methods.

The AHP method was employed to identify and prioritize operational criteria and sub-criteria based on their relative importance to the overall objective. The analysis focused on three main criteria: The operational cost, health, safety, and environment (HSE), and service reliability. The results of the Analytical Hierarchy Process (AHP) indicated that the most critical sub-criteria in strategic decision-making are Fuel Cost, Transportation Cost, and Timely Delivery.

Subsequently, the FMEA method was employed to identify potential failure modes during operations by assessing the severity, occurrence, and detection levels. A total of eight hypothetical yet pertinent failure modes were subjected to evaluation, encompassing fuel leakage, imprecise route planning, delivery delays, and fire incidents. The highest Risk Priority Number (RPN) was attributed to fuel leakage (180), underscoring its status as the most substantial operational and environmental risk.

The integration of AHP and FMEA establishes a comprehensive decision-support framework, enabling the company to ascertain the issues of utmost importance and the risks that necessitate immediate attention. This dual-method approach enhances strategic planning and supports proactive risk mitigation, even in the absence of historical incident data.

**Keywords:** Analytic Hierarchy Process (AHP), Failure Mode and Effect Analysis (FMEA), Risk Management, Operational Efficiency, Maritime Logistics, PT Faher Hayat Bersatu