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The Role of Fleet Management in Improving Fuel Efficiency, Crew Productivity, and Shipping Company Revenues

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ABSTRACT

The shipping sector in Indonesia is growing rapidly, but fierce competition and the dominance of foreign vessels are compelling shipping companies to enhance fuel efficiency, crew productivity, and revenue. This research aims to conduct an in-depth analysis of the role of fleet management in improving the operational performance of shipping companies. The approach used is qualitative descriptive, with data collected through literature reviews and interviews. Data analysis is conducted thematically, beginning with data reduction, followed by presentation in narrative form, and culminating in conclusions to identify patterns. The research findings indicate that the implementation of effective fleet management—including route planning, fuel consumption monitoring, and ship maintenance scheduling—can significantly reduce fuel consumption. Crew productivity is boosted through systematic assignments, continuous training, and the utilization of fleet monitoring technology, all of which positively influence shipping safety and delivery reliability. This impact is also evident in increased company revenue through the reduction of operational costs and the improvement of profit margins. The implications of these findings underscore the importance of adopting an integrated fleet management strategy to enhance operational efficiency, crew productivity, and the overall competitiveness of shipping companies in Indonesia.

KEYWORDS *company revenue, crew productivity, fleet management, fuel efficiency, shipping operations*

INTRODUCTION

Population growth, urbanization, and industrialization directly increase the demand for transportation services, including sea transportation and its supporting infrastructure (Oloruntobi et al., 2023; Walker et al., 2019). The need for maritime transportation is not limited to goods, but also involves the distribution of food and water, which is increasingly important given the deteriorating growth conditions and the impacts of climate change. As these needs grow, the role of maritime

transportation and port infrastructure becomes vital in supporting the smooth flow of trade and community mobility (Fratila et al., 2021).

Indonesia, as an archipelagic country with more than 17,000 islands, has a land area of 1,904,569 km² and a sea area of 3,288,683 km². This geographical condition makes maritime transportation the backbone for building communication and interaction networks between islands, supporting economic, social, and cultural activities (Cipta & Wibowo, 2021). Maritime transportation facilitates the movement of goods and people and supports national development through effective connectivity between regions.

Based on data from the Sea Transportation Traffic Management System (SIMLALA), there are around 60,000 ships operating each year, transporting up to 1 billion tons of goods in and out of Indonesian waters. Of the total number of vessels engaged in export-import activities during the 2017–2022 period, approximately 37% were Indonesian vessels, while the remaining 63% were foreign vessels. In 2022, the number of ships sailing in Indonesian waters reached 10,534 units, with 9,458 of them being foreign ships (Direktorat Jenderal Perhubungan Laut, 2023). These figures indicate that although Indonesia has a significant national fleet, foreign vessels still dominate international maritime transportation in national waters. This situation highlights challenges faced by the domestic shipping sector, which may arise from natural factors such as weather and sea conditions, as well as fierce competition among shipping companies (Cipta & Wibowo, 2021).

The success of a shipping company can essentially be measured by the revenue achieved in a given period compared to the previous period. Optimal revenue is an important indicator, as it reflects operational efficiency, competitiveness, and the achievement of predetermined profit targets. Clear revenue targets help companies plan business strategies and assess performance, while time-based targets ensure they fulfill service agreements with customers or ship charterers punctually. However, in practice, shipping companies often face obstacles that hinder these targets. Common obstacles include a shortage of skilled human resources to effectively monitor ship operations, as well as insufficient ship engine maintenance, which can degrade ship performance.

To overcome these obstacles, fleet management is a key determinant of a shipping company's success. Fleet management is the process of managing and supervising all vehicles owned or operated by a company or organization, with the primary goal of ensuring operational efficiency, safety, and effectiveness (Giathi & Karanja, 2020). In the shipping sector, fleet management involves not only the operation and maintenance of ships, but also strategic decision-making, voyage scheduling, assigning ships to specific routes, and determining optimal sailing speeds (Peres, 2025).

The primary objective of fleet management in maritime transportation is to minimize operational costs, including fleet recruitment and fuel consumption, while reducing greenhouse gas emissions. On offshore supply vessels, fleet management typically focuses on maximizing delivery service levels, whereas on cargo vessels, the main objective is to maximize profit from sales. In general, fleet management policies are designed to meet demands for timely and accurate deliveries, thereby reducing delays (Peres, 2025).

Effective fleet management also has the potential to increase company revenue through reduced operating costs, increased transport capacity, and improved service reliability. Strategies such as preventive maintenance, the adoption of technology to monitor fuel consumption, and continuous crew training are crucial to achieving higher operational efficiency and productivity.

Previous studies have demonstrated that implementing a fleet management system can have a significant impact on the operational efficiency of shipping companies. Marsudi et al. (2025) found that such a system improves data accuracy, accelerates decision-making, and can reduce operational costs by up to 15%. Additionally, the implementation of this system positively affects ship maintenance and fuel savings—two of the largest cost components in ship operations.

Research by Utomo et al. (2024) shows that the Fleet Management System (FMS) offers key features such as automated reminders, periodic maintenance checks, and transaction reporting. These features help companies manage their fleets more systematically, strengthen operational administration, and control fleet expenses more efficiently. Meanwhile, a pilot study implementing a similar system in Brazil indicated that policies developed through integrated fleet management can improve fleet performance indicators. Comparative analysis of these policies reveals varied impacts across different indicators, enabling managers to select the most effective policy based on a balance between delivery service levels, operational costs, and emissions—aligned with company objectives (Peres, 2025).

However, although many studies highlight the benefits of technology-based fleet management systems, most focus mainly on cost efficiency and ship maintenance. There is limited research specifically examining the impact of fleet management on crew productivity and shipping company revenue in Indonesia, especially given the dominance of foreign vessels over the national fleet. Moreover, the integration of fuel efficiency, crew productivity, and revenue growth has rarely been investigated comprehensively in a single study.

This research aims to fill that gap by emphasizing the role of fleet management in Indonesian national shipping companies. Beyond fuel efficiency and ship maintenance, it also explores the influence of fleet management on crew productivity and revenue, along with optimization strategies to enhance the competitiveness of the national fleet. Furthermore, it seeks to conduct an in-depth

analysis of how fleet management can improve fuel efficiency, crew productivity, and shipping company revenues in the maritime industry. The findings are expected to contribute to the academic literature on fleet management in Indonesia and offer strategic recommendations that shipping companies can implement to boost operational performance and competitiveness in an increasingly challenging maritime transportation market.

RESEARCH METHOD

This research employed a qualitative descriptive approach to gain an in-depth understanding of the role of fleet management in shipping company operations. It was conducted in Jakarta, Indonesia, focusing on shipping companies operating in Indonesian waters, particularly those managing national fleets that competed with foreign vessels in domestic and international maritime transportation. The study focused on the processes and strategies implemented by companies in managing fleets and their impact on fuel efficiency, crew productivity, and company revenue.

The research population comprised stakeholders involved in fleet management within shipping companies operating in Jakarta. These included fleet managers, operational managers, ship captains, crew members, and finance personnel directly engaged in fleet operation and decision-making. The accessible population was estimated at approximately 150 individuals across five major shipping companies in the Jakarta region.

A purposive sampling technique was used to select participants based on criteria relevant to the research objectives. The sample size was determined using the saturation principle, continuing data collection until no new information emerged. Ultimately, 15 informants were selected, consisting of 3 fleet managers, 3 operational managers, 4 ship captains, 3 crew members, and 2 finance department personnel. Selection criteria included a minimum of three years of experience in fleet management or ship operations, active involvement in fleet-related decision-making, willingness to participate, and the ability to articulate professional experiences clearly.

Data collection involved two primary methods. First, a literature review gathered secondary data from books, journals, government reports, and company documents related to fleet management and shipping operations. Second, in-depth semi-structured interviews were conducted with the 15 informants. Interviews, lasting 45–60 minutes, were conducted face-to-face at secure and convenient locations such as company offices and port facilities. All sessions were audio-recorded with consent and transcribed verbatim for analysis.

The study's data sources consisted of both primary and secondary data. Primary data were obtained from interviews exploring experiences and perspectives on route management, fuel-saving strategies, crew organization, and revenue

performance. Secondary data were drawn from academic journals, industry reports, government publications, company records, and databases such as the *Sea Transportation Traffic Management System (SIMLALA)* and publications from the *Direktorat Jenderal Perhubungan Laut*.

Data analysis was carried out thematically. The process began with data reduction to identify relevant information, followed by data presentation in narrative and chart form, and concluded with the identification of patterns that illustrated how fleet management practices contributed to improving fuel efficiency, crew productivity, and company revenue. Thematic analysis involved six phases: familiarization with data, code generation, theme identification, theme review, theme definition, and final report writing. To ensure data credibility and reliability, the research applied triangulation of data sources, member checking with participants, and peer debriefing with qualitative research experts. Through this method, the study explained how shipping companies managed their fleets and how these practices affected operational efficiency and financial performance.

RESULTS AND DISCUSSION

Ships are high-value assets in the maritime transportation industry, particularly in the container shipping sector. For shipowners and shipping companies, the primary consideration when investing in ship procurement is typically related to prevailing market conditions. Investment decisions can be directed at meeting increasing market demand, preventing the entry of new competitors, or strengthening their competitive position with other shipping companies (Dirhamsyah et al., 2021). Once the investment decision is made, the next strategic question arises: whether it is more appropriate to order a new vessel or choose a used vessel that suits their operational needs. Ultimately, companies must also determine the type of vessel most relevant to their business strategy and specific objectives (Herwantono et al., 2022).

The shipping industry plays a crucial role as a key driver of trade and distribution of goods, both domestically and internationally. Companies operating in this sector face complex operational challenges, ranging from coordinating shipments and managing fleets to managing significant operational costs. This high level of complexity demands systematic and professional management, ensuring that available financial and operational information can be used to support accurate, timely, and efficient decision-making (Nurhidayanti & Yuliastuti, 2025).

Optimal fleet management is crucial for shipping companies to maintain smooth operations and strengthen their position in global competition (Harsyanti, 2024). Many shipping companies in Indonesia still face various obstacles, such as lack of integrated information systems, time-consuming decision-making processes, and cost overruns due to a lack of efficiency in fleet management. This

situation is exacerbated by increasingly stringent international regulations, including safety standards such as the International Safety Management (ISM) Code, which require companies to adapt quickly. Furthermore, intensifying competition in the shipping industry demands smarter and more measurable fleet management strategies to ensure companies' survival and growth (Marsudi et al., 2025).

Fleet management plays a crucial role in ensuring the smooth operation of modern ports, encompassing various interrelated aspects of operational efficiency. This process focuses not only on scheduling ship departures and arrivals but also encompasses the use of technology and information systems to support faster and more accurate decision-making. With the implementation of digital technology, fleet management has become more integrated, facilitating real-time monitoring of ship conditions, maintenance planning, and logistics management (Supangat, 2024).

The use of technology in fleet management offers shipping companies significant opportunities to improve operational efficiency. With digital systems and fleet management software, companies can optimally plan shipping routes, monitor vessel positions in real time, and reduce port waiting times (Dewi et al., 2024). This not only reduces fuel consumption and operational costs but also ensures optimal fleet utilization, allowing vessels to operate more productively and economically. Furthermore, digital monitoring allows for early detection of potential problems, allowing repairs or interventions to be implemented before significant disruptions to shipping schedules occur (Farasichwan & Hartanto, 2024).

Beyond efficiency, technology in fleet management also improves customer satisfaction through more reliable and timely service. Ships operating on schedule and on efficient routes enable faster and more consistent delivery of goods, thereby increasing client trust and loyalty (Herwantono, 2021). With the support of modern systems such as fleet management systems and satellite-based monitoring, companies are able to make data-driven decisions quickly and accurately, strengthen coordination between departments, and increase operational transparency. This combination of efficiency, reliability, and quality service directly strengthens shipping companies' competitiveness in an increasingly competitive global market (Zulmaidi & Rante, 2024).

Fleet management has a strategic role in supporting the operational success of shipping companies, especially in three main aspects, namely fuel efficiency, crew productivity, and increasing company revenue.

1. Fuel Efficiency

Good fleet management enables companies to organize shipping schedules, select optimal routes, and utilize monitoring technology to monitor fuel

consumption in real time. The use of digital systems such as fleet management systems also enables companies to perform scheduled vessel maintenance to ensure engines remain operating at peak performance and reduce fuel consumption.

Along with the increasing volume of global trade, technological advancements, and the development of civilization, maritime industry operations have also become increasingly complex. Ships of various sizes and types now carry cargo with specific characteristics that require more detailed handling. Ship maintenance processes, such as drydocking, have become increasingly modern, but they also present new challenges in terms of safety, operational efficiency, and workforce management (Bachtiar, 2024).

For shipping companies serving various international routes, cost control is crucial to balance the interests of shareholders and other stakeholders. Decisions related to shipping routes, fuel consumption, crew salaries, ship maintenance costs, and overhead expenses are crucial for business sustainability (Dian, 2024). When this data is managed with an appropriate and integrated approach, it can be transformed into valuable information. This processing provides management with in-depth insights to make more accurate, efficient, and bias-free decisions. Data-driven fleet management not only supports cost efficiency but also strengthens shipping companies' competitiveness amidst the dynamics of the global industry (Saputra, 2025).

Thus, with the increasing complexity of the maritime industry due to growing trade volumes, vessel diversity, and demands for cost efficiency, sound fleet management is key to the success of shipping companies. Integrated operational data management enables companies to make informed decisions regarding vessel maintenance, crew management, and efficient resource utilization. In practice, effective fleet management enables more structured shipping schedules, optimal route determination, and the use of monitoring technology to monitor fuel consumption in real time, thus not only reducing operational costs but also increasing crew productivity and ultimately boosting company revenue.

2. Crew Productivity

Crew productivity can be improved through structured fleet management, for example, through clear task allocation, ongoing training, and balanced work schedules. A well-managed fleet minimizes workload overload and improves safety, allowing crews to work more focused and efficiently. Management that prioritizes crew welfare also contributes to motivation and loyalty, which ultimately positively impacts ship operational performance (Sembiring, 2024).

One step companies can take to strengthen quality fleet management is to focus on improving human resource (HR) capacity. This can be done through providing specialized training related to fleet management, recruiting new workers with competencies and experience in the field, and providing staff with a deeper

understanding of their duties and responsibilities. This way, employees not only have adequate technical skills but also an awareness of the importance of their role in maintaining the smooth operation of the fleet as a whole (Orda 2020). A company's success depends heavily on the quality of its human resources. In an era full of dynamic change, every individual is required to have high adaptability to face various challenges appropriately (Simbolon, 2021). Therefore, HR management no longer functions solely as an administrative function but also plays a strategic role in developing employee potential so they can think creatively, work innovatively, and make optimal contributions to the organization's progress. According to Parmenas et al. (2021), crew selection management provides several important benefits for organizations in maintaining the sustainability and quality of their human resources, as follows.

a. Placing human resources in the right position
   Through skills and competency mapping, companies can ensure that employees work according to their expertise so that productivity increases and job satisfaction is maintained.
b. Improving retention of talented employees
   Talent management strategies help companies retain potential employees through career development programs, performance rewards, and clear succession planning.
c. Supporting a higher quality recruitment process
   With a structured talent system, companies are able to attract and select the best potential employees at all levels, thereby maintaining the continuity of workforce quality.
d. Understanding employees more deeply
   A systematic assessment provides an overview of an individual's strengths, weaknesses, aspirations, and motivations, so that companies can design targeted development strategies.
e. Facilitating professional development decisions
   Identifying high-potential employees makes it easier for companies to determine training, learning, and performance management investments to drive individual and organizational growth.

Thus, crewing agents play a crucial role in ensuring the availability of competent seafarers who meet international safety standards, ensuring smooth and safe ship operations. Through a structured recruitment, training, and crew placement process, crewing agents ensure that each seafarer has the certifications and skills necessary to navigate various conditions at sea. Thus, the presence of crewing agents not only supports ship productivity and operational efficiency but also minimizes the risk of accidents and financial losses, while maintaining the shipping company's global reputation (Anshori et al., 2025).

3. Company Revenue

All efforts lead to increased revenue for shipping companies. Fuel efficiency directly reduces operational costs, while higher crew productivity improves punctuality and customer service quality. Fleet management plays a crucial role in increasing shipping companies' revenues through efficient and strategic operational management. With structured fleet management, companies can ensure ships operate on schedule, avoid delays, and maintain timely delivery of goods. Punctuality is a crucial factor in the shipping industry because it is directly related to customer trust. The higher the level of operational reliability, the greater the company's chances of securing long-term contracts and repeat customers, ultimately driving increased revenue (Periyadi et al., 2024).

Furthermore, good fleet management allows companies to minimize operational costs by selecting more efficient shipping routes, controlling fuel consumption, and properly scheduled vessel maintenance. This cost efficiency will result in more competitive service prices without compromising quality. By offering competitive rates while maintaining service standards, companies can attract more clients, expand market share, and increase the volume of cargo transported (Hutari, 2025).

Modern fleet management utilizing digital technologies, such as satellite-based vessel monitoring and fleet management systems, can provide full visibility into vessel conditions and crew performance. This integrated data helps companies respond to issues more quickly, improve crew productivity, and maintain safe operations. The combination of efficiency, safety, and customer satisfaction strengthens a company's reputation, a crucial factor in achieving global competitiveness.

Thus, the role of fleet management in increasing shipping company revenue is highly strategic because it encompasses efficient and planned operational management. By optimizing shipping routes, monitoring fuel consumption, and scheduling ship maintenance appropriately, companies can reduce operational costs while maintaining service quality. High crew productivity ensures ships operate on schedule, improves on-time delivery, and strengthens customer trust. This operational punctuality and reliability not only increase the chances of securing long-term contracts and loyal customers but also open up opportunities to expand market share. Furthermore, the use of modern digital technologies, such as satellite-based ship monitoring systems and fleet management systems, provides full visibility into vessel conditions and crew performance, enabling rapid response to issues and improving operational efficiency and safety. With the combination of cost efficiency, crew productivity, and customer satisfaction, effective fleet management directly drives sustainable revenue growth for shipping companies.

CONCLUSION

Fleet management is vital in enhancing the operational performance of shipping companies by optimizing fuel efficiency, crew productivity, and overall revenue. Through efficient route planning, real-time fuel monitoring, and regular maintenance, companies can minimize costs while ensuring reliable operations. Structured crew management—encompassing recruitment, training, and competency development—further promotes safety, motivation, and service quality. The integration of these strategies with digital technology strengthens global competitiveness and supports sustainable revenue growth. Future research should explore how digitalization and data-driven decision-making in fleet management can further enhance efficiency and sustainability in Indonesia's maritime industry.

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