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Improving Warehouse Operations in Cargo Companies through Agile-based Warehouse Management System

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ABSTRACT
This research addresses the complex problem of warehouse operations of freight forwarders, which often face challenges related to stock management, dispatch, and distribution of goods. This research proposes an Agile approach as a potential solution by looking at traditional warehouse management systems that must be more responsive to changing customer demands and dynamic market conditions. Literature analysis and case studies show that implementing an Agile-based warehouse management system can improve operational efficiency and flexibility. By applying Agile principles, companies can be more responsive to change, increase team collaboration, and improve the process of stock management, dispensing, and distribution of goods. This research provides a better understanding of the relevance of Agile principles in managing a freight forwarder's warehouse operations while highlighting the potential advantages that can be gained through implementing an Agile-based warehouse management system, as well as the challenges that need to be overcome in the process. As such, this research provides a strong foundation for recommending the use of Agile-based warehouse management systems to improve operational efficiency and effectiveness in the freight forwarding industry.

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INTRODUCTION

The growth of the Global Logistics Industry has become a key driver for global economic development, with a crucial role in supporting global supply chains. This phenomenon is fuelled by increasing international trade, shifting global consumption patterns, and technological advancements. Amidst this complexity, freight forwarders play an essential role as the link between producers and consumers in the global supply chain(Hunt et al., 2023; Njoya et al., 2023; Tseremoglou et al., 2022). By efficiently managing the transport and distribution of goods, freight forwarders facilitate the flow of goods from producers to consumers in different parts of the world. However, warehouse operations in freight forwarding companies face several challenges that affect the efficiency and reliability of their services. Such chal-

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lenges include increasing complexity in stock management, goods dispatch, and timely distribution to the intended destination. As a result, freight forwarders must find innovative solutions to improve their warehouse operations to overcome these challenges and remain competitive in an increasingly competitive market(Kim et al., 2021; Li et al., 2021; Yang et al., 2023).

In logistics, warehouses have a central role in managing the flow of goods in the supply chain. In general, a warehouse can be defined as a storage and management facility that acts as a transit point in the journey of goods from the producer to the end consumer. Its main functions include storage, stock management, order processing, and efficient distribution of goods. The main processes in warehouse operations include goods receiving, storage, order picking, and delivery to customers(Bombelli & Fazi, 2022; Camacho-Muñoz et al., 2023; Gonzalez-Calderon et al., 2022; Kooij et al., 2021). Each step in this process requires meticulous planning and execution to ensure the smooth flow of goods and efficient stock management. Warehouse efficiency is critical to improving business performance, as efficient warehouse operations can reduce stocking costs, speed up the delivery of goods to customers, and improve overall customer satisfaction. Thus, an in-depth understanding of the warehouse function, its operational processes, and the role of warehouse efficiency in business performance is essential in improving the effectiveness of company operations, especially in the highly competitive logistics industry(Jörgensen et al., 2023; Lokras et al., 2022; Polkinghorne et al., 2024).

Traditional Warehouse Management Systems are often faced with several constraints and limitations that can hinder the smooth operation of the warehouse. These constraints may include a need for more flexibility in accommodating changes in demand or customer needs, a lack of real-time visibility of stock, and limitations in order or delivery management. Challenges in managing stock, dispatch, and distribution of goods further complicate warehouse operations. These include difficulties in predicting demand, managing stock rotation, and optimizing the release of goods to match customer demand. The impact of these constraints and challenges can negatively affect operational productivity and the quality of service provided by the company. Delays in order fulfillment, stock inaccuracies, or errors in goods delivery can lead to customer dissatisfaction and harm the company's reputation. Therefore, it is essential to find practical solutions to overcome these constraints to increase operational efficiency and improve the quality of services freight forwarders provide(Narayanan & Antoniou, 2022; Soprano et al., 2023; Yıldız et al., 2023).

Definition and Philosophy Agile has become a popular approach to software development and business projects in the modern era. The principles underlying the Agile approach include adaptability, team collaboration, responsiveness to change,

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and a focus on periodic value generation. These principles promote an iterative and incremental approach to product or service development, allowing for quick adjustments to changing needs or market circumstances. The relevance of Agile principles can also be applied in warehouse operations management, especially in the context of improving efficiency and responsiveness to customer demands. Strong team collaboration and adaptability in managing warehouse operations can help freight forwarders more quickly adjust to changes in demand or unforeseen operational conditions. In addition, the Agile approach also enables continuous updates and improvements in warehouse operational processes, which in turn can improve productivity and overall service quality. Therefore, applying Agile principles in warehouse operations management can be an effective strategy for improving the performance of freight forwarders amidst the increasingly fierce competition in the logistics industry.

The development and adoption of Agile-based warehouse management systems has become a significant trend across various industries. This approach emerged in response to the need for greater flexibility, adaptability, and responsiveness in managing warehouse operations. Many companies, including those not in the technology industry, have started adopting Agile concepts to improve their operational efficiency and performance. Case studies on the successful implementation of Agile-based warehouse management systems show its positive impact on productivity, service quality, and customer satisfaction. Companies that have successfully implemented this approach find that they can quickly adapt their warehouse operations to changes in market demand or customer needs, improving their competitiveness. However, while the potential benefits of utilizing an Agile-based warehouse management system are exciting, the challenges are significant. Successful implementation requires strong commitment, investment of sufficient resources, and organizational culture changes that may take time to implement. In addition, adapting to Agile principles can also require changes in established operational processes, which can be a complicated and challenging process(Hasan et al., 2013; Humpert et al., 2022; Meiliana et al., 2023; Michalides et al., 2023; Mishra & Alzoubi, 2023; Paasivaara et al., 2018; Tøndel et al., 2022). Therefore, while the potential advantages of utilizing an Agile-based warehouse management system are exciting, it is worth remembering that challenges must be overcome in the implementation process.

This research is fundamental to the issues discussed as it highlights freight forwarders' challenges in managing their warehouse operations. A summary of such challenges includes complexities in stock management, goods dispensing, and timely distribution, all of which can hinder efficiency and service quality. Therefore,

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this research investigates potential solutions to address these challenges. The justification for using an Agile-based warehouse management system in this research is greater flexibility, adaptability, and responsiveness in warehouse operations.

By applying an Agile approach, freight forwarders are expected to improve their operational efficiency, enhance the quality of service to customers, and strengthen their competitive position in an increasingly fierce market. As such, this research not only aims to provide new insights into the use of Agile-based warehouse management systems but also to make a real contribution to improving the overall operational performance of freight forwarding companies.

METHODS

This research involves three main stages in developing an Agile-based warehouse management application. The first stage was user requirements analysis, where the users' needs, preferences, and expectations were understood through direct interaction. The second stage involves the development of the application using an Agile approach, with the formation of teams working in short iterations to plan, develop, and evaluate the application. The final stage is functional evaluation and user acceptance, where the app is thoroughly tested to ensure it fulfills the functional requirements and is easy for end users to use before it is fully implemented.

Figure 1. Research Stages

User Needs Analysis

The user requirements analysis stage is an essential initial phase in the application development process. By identifying key stakeholders and directly interacting with potential users, the main objective is to understand their needs, preferences, and expectations regarding the application to be developed. Standard methods used in this stage include interviews, focus group discussions, and observations. The result of this analysis stage is a requirements analysis document that contains a set of required features and functionalities. This document becomes the primary reference for the development team in the next stage.

Application Development

Application development using the Agile approach involves forming teams consisting of various roles, such as software developers, testers, and product owners. Teams work in iterations called sprints, planning, developing, and evaluating deliverables within a short timeframe. The process is iterative, focusing on team

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collaboration, rapid response to change, and periodic delivery of business value. The product backlog is used as a to-do list, while stand-up meetings, sprint planning, sprint reviews, and sprint retrospectives are some of the regular activities in Agile development.

User Acceptance Evaluation

The functional evaluation and user acceptance stage is when the application has been completed and is ready to be tested by end users. This stage includes functional testing, usability evaluation, and beta trials with end users. These evaluations ensure that the application fulfills the functional requirements set and is easy to use and intuitive for users. The results of these evaluations will be used to make final improvements before the app is approved for full use by end users.

RESULTS AND DISCUSSION

User Needs Analysis

The results of the user requirements analysis are as follows: Firstly, critical stakeholders involved in using the application were identified, including warehouse management, operators, and internal administrative personnel, as well as external customers and business partners. Secondly, focus group discussions or in-depth interviews were used to gain an in-depth understanding of the users' needs, preferences, and expectations of the warehouse management application to be developed. Thirdly, a requirements analysis document was drafted detailing users' desired features and functionality. This document included functional and non-functional requirements, such as stock management, shipment tracking, order processing, analytical reports, and integration with existing systems. Finally, requirements are validated and prioritized by involving relevant stakeholders to ensure that user needs are clearly understood and priority is given to the most critical and urgent features. Thus, these steps ensure that a comprehensive understanding of user needs is achieved before proceeding to the next stage of development.

Table 1. Data Collection Results

Stakeholder	Desired Features and Functionalities	Priority
Warehouse Management	Real-time Inventory Tracking	High
Warehouse Operators	Automated Order Processing	High
Administrative Staff	Analytical Reports for Warehouse Performance	Medium
Customers	Shipment Tracking	High
Business Partners	Integration with ERP System	Medium

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Table 1 lists the results of the user requirements analysis in the development of the warehouse management application. First, the stakeholders are the warehouse management, who emphasized the importance of real-time stock tracking. This feature has a high priority because it allows management to have proper visibility of the inventory in the warehouse, which is essential in making effective decisions related to inventory management. Furthermore, warehouse operators also highlighted the need for automated order processing. This feature is also highly prioritized as it can improve the efficiency of warehouse operations by reducing errors and the time required for order processing. On the other hand, administrative personnel need analytical reports for warehouse performance, which has a medium priority. While necessary for long-term monitoring, this may be a lower priority than operational features directly affecting daily efficiency. Customers highlight the need for goods shipment tracking, which is a high priority as it allows them to monitor their shipments' status easily. Finally, business partners expect integration with ERP systems, which has a medium priority due to its possible impact on integrating existing systems and the availability of resources for its implementation. By prioritizing the user requirements according to the table, developers can adjust the application development planning appropriately according to the user's critical needs.

Application Development

A series of steps and practices have been implemented during application development using the Agile approach to ensure a smooth development process. First, a development team is formed considering the requirements involving software developers, testers, and product owners. After that, sprint scheduling defines a specific period during which iterative development will be carried out on an ongoing basis. Creating the product backlog is also crucial in determining the list of features and functionality to be developed during the process. Sprint planning is then done to plan the tasks that will be done during the sprint period.

Furthermore, iterative development includes coding, testing, and continuous integration stages. Stand-up meetings are held regularly to ensure good coordination and monitor progress. After completion of the sprint, a sprint review is conducted to evaluate the work and get feedback from stakeholders. Finally, a sprint retrospective is used to evaluate the development process and identify areas of improvement for improvement in the next sprint. With these steps, the application development process can run efficiently and respond to changes.

Figure 2 shows the sprint scheduling process in the Agile development methodology. The stages in the process are represented by the various states shown in the diagram. The stages start from the "Idle" state, which is the system's initial state before the scheduling process begins. Once the scheduling begins, the system

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moves to the "SprintScheduled" state, which signifies that the sprint has been scheduled and is ready to perform. Next, the team enters the sprint planning stage ("SprintPlanning"), where sprint goals and resources are allocated. Once planning is complete, the process continues into the iterative development stage ("Iterative-Development"), where the team performs development iterations and produces outputs according to the sprint timeframe. After the development iterations are completed, the system enters the evaluation stage ("ReviewAndEvaluation"). Here, the team evaluates the sprint results, checks for goal achievement, and identifies areas of improvement. The transition from one stage to another occurs after a particular stage is completed. For example, after the sprint planning is complete, the system moves to the iterative development stage, and so on. Once the evaluation is complete, the system returns to the initial "Idle" state to schedule the next sprint. Thus, this state diagram helps the development team understand the workflows and processes involved in scheduling a sprint and ensures that each stage is executed correctly according to the goals set in the Agile methodology.

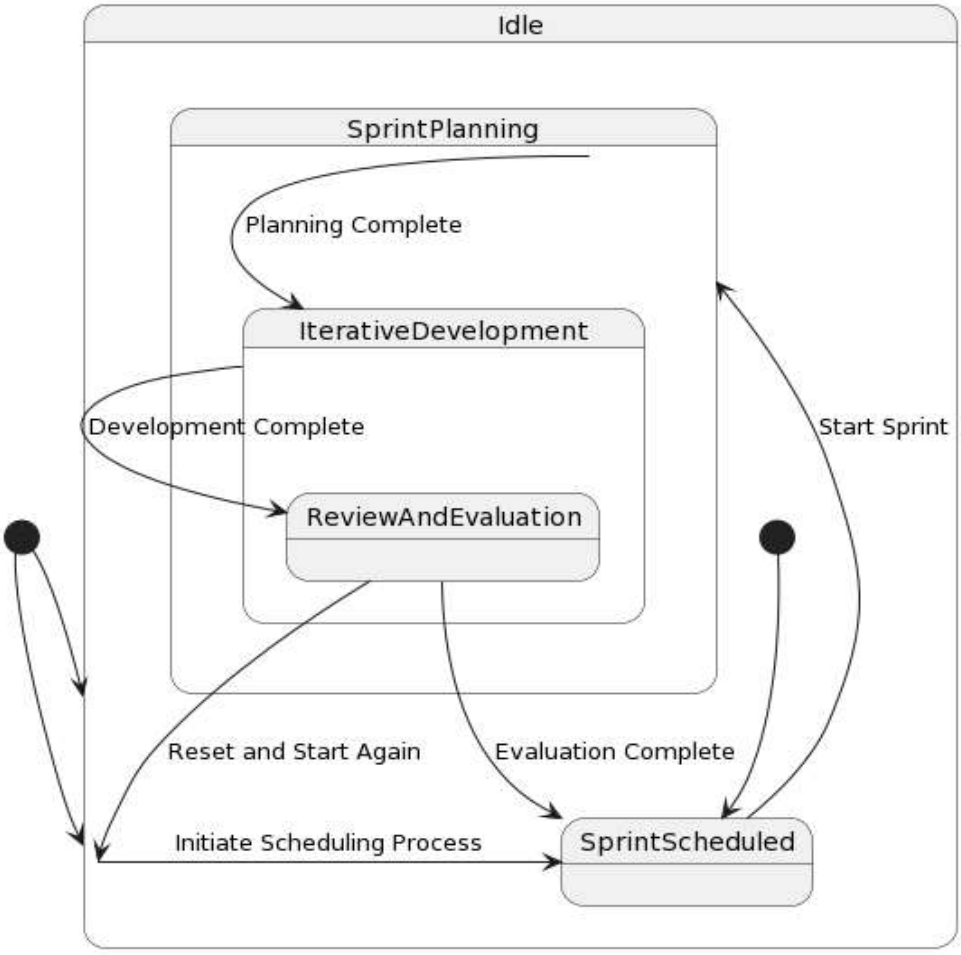

Figure 2. State Diagram

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Table 2 presents a warehouse management application's desired features and functionality to improve the efficiency and effectiveness of warehouse operations and freight forwarding processes. Analysis of each feature and its functionality reveals specific business needs and their impact on increased productivity and more efficient management. The real-time inventory tracking feature enables livestock monitoring, minimizes the risk of stock shortages, and improves customer satisfaction through better responsiveness. Automated order processing can improve a company's operational efficiency by reducing human errors and optimizing the delivery of goods. The analytical reports provided by the app facilitate an in-depth evaluation of warehouse performance, providing the necessary insights for the identification of areas of improvement and more informed decision-making. The shipment tracking feature provides the necessary transparency to customers regarding the delivery status of their goods, reducing customer queries and complaints. Integration with ERP systems ensures data consistency between warehouse management and broader business systems, improving coordination between departments and optimizing overall business processes. Thus, a comprehensive and integrated warehouse management application can provide significant advantages for companies in the face of increasingly fierce market competition.

Table 2 Features

Features	Functions
Real-time Inventory Tracking	Allows users to track and monitor inventory in real-time, including tracking inbound and outbound items, stock adjustments, and physical location tracking in the warehouse.
Automated Order Processing	Automates the order processing process from order placement to delivery, including automated order receipt, stock verification, delivery scheduling, and automated invoice and receipt generation.
Analytical Reports for Warehouse Performance	Provides in-depth analytical reports on warehouse performance, including operational efficiency analysis, warehouse space utilization, workforce productivity, and inventory costs.
Shipment Tracking	Enables users to track the status of shipments in real-time, including information on item location, estimated time of arrival, and shipment history.
Integration with ERP System	Integrates the application with the existing Enterprise Resource Planning (ERP) system, facilitating seamless data exchange between warehouse management system and

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Features	Functions
	ERP system, such as customer data, order data, and financial information.

User Acceptance Evaluation

The functional testing process is conducted to ensure that the application fulfills all pre-defined requirements, including testing various application features and functionality to perform as expected. In keeping with the user-centered approach, demo sessions or beta trials are held with end-users to get first-hand feedback on the user experience and identify areas of improvement that may be needed before the official launch. Usability evaluations were conducted to ensure that the application was easy to use and intuitive for end users, which included testing the navigation, user interface, and clarity and consistency of the application design. Based on user feedback and evaluation results, improvements and enhancements are made to the app, including bug fixes, user interface adjustments, or adding new features according to user needs. Before the official launch, training sessions or workshops are held to prepare users to use the app so that they have a sufficient understanding of the app's features and can use it effectively in their work environment. Finally, end-user acceptance is done once the app is ready for use. This includes verifying that the app has met their expectations and is ready for use in their daily operations. Thus, this series of steps ensures that the end users receive the app well and function as expected in their work environment.

CONCLUSION

Implementing an Agile-based warehouse management system has great potential to improve a freight forwarding company's operational efficiency and effectiveness. By implementing an Agile approach, companies can be more responsive to changes in customer demand and dynamic market conditions. This research highlights the importance of understanding the challenges in a freight forwarder's warehouse operations, especially regarding stock management, dispensing, and distribution of goods. Ag-ile warehouse management systems can help overcome these constraints by providing the necessary flexibility, transparency, and collaboration in warehouse operations management. Case studies of successful implementations of Agile-based warehouse management systems provide insight into the potential benefits, such as increased productivity and service quality, as well as the challenges that need to be overcome, such as organizational culture change and complex technology integration. Therefore, this research provides a strong foundation for

advocating the use of Agile-based warehouse management systems as a solution that can significantly improve freight forwarding companies' warehouse operations.

REFERENCE

Bombelli, A., & Fazi, S. (2022). The ground handler dock capacitated pickup and delivery problem with time windows: A collaborative framework for air cargo operations. *Transportation Research Part E: Logistics and Transportation Review*, *159*. https://doi.org/10.1016/j.tre.2022.102603

Camacho-Muñoz, G. A., Franco, J. C. M., Nope-Rodríguez, S. E., Loaiza-Correa, H., Gil-Parga, S., & Álvarez-Martínez, D. (2023). 6D-ViCuT: Six degree-of-freedom visual cuboid tracking dataset for manual packing of cargo in warehouses. *Data in Brief*, *49*. https://doi.org/10.1016/j.dib.2023.109385

Gonzalez-Calderon, C. A., Posada-Henao, J. J., Granada-Muñoz, C. A., Moreno-Palacio, D. P., & Arcila-Mena, G. (2022). Cargo bicycles as an alternative to make sustainable last-mile deliveries in Medellin, Colombia. *Case Studies on Transport Policy*, *10*(2), 1172–1187. https://doi.org/10.1016/j.cstp.2022.04.006

Hasan, R., Ta, A.-, & Razali, R. (2013). Prioritizing Requirements in Agile Development : A Conceptual Framework. *Procedia Technology*, *11*(Iceei), 733–739. https://doi.org/10.1016/j.protcy.2013.12.252

Humpert, L., Röhm, B., Anacker, H., Dumitrescu, R., & Anderl, R. (2022). Method for direct end customer integration into the agile product development. *Procedia CIRP*, *109*, 215–220. https://doi.org/10.1016/j.procir.2022.05.239

Hunt, J. D., Nascimento, A., Tong, W., Zakeri, B., Jurasz, J., Patro, E. R., Đurin, B., de Jesus Pacheco, D. A., de Freitas, M. A. V., Filho, W. L., & Wada, Y. (2023). Perpetual motion electric truck, transporting cargo with zero fuel costs. *Journal of Energy Storage*, *72*. https://doi.org/10.1016/j.est.2023.108671

Jörgensen, A. M., Wibel, R., Veider, F., Hoyer, B., Chamieh, J., Cottet, H., & Bernkop-Schnürch, A. (2023). Self-emulsifying drug delivery systems (SEDDS): How organic solvent release governs the fate of their cargo. *International Journal of Pharmaceutics*, *647*. https://doi.org/10.1016/j.ijpharm.2023.123534

Kim, S., Sohn, W., Lim, D., & Lee, J. (2021). A multi-stage data mining approach for liquid bulk cargo volume analysis based on bill of lading data. *Expert Systems with Applications*, *183*. https://doi.org/10.1016/j.eswa.2021.115304

Kooij, C., Kana, A. A., & Hekkenberg, R. G. (2021). A task-based analysis of the economic viability of low-manned and unmanned cargo ship concepts. *Ocean Engineering*, *242*. https://doi.org/10.1016/j.oceaneng.2021.110111

Li, W., Pundt, R., & Miller-Hooks, E. (2021). An updatable and comprehensive global cargo maritime network and strategic seaborne cargo routing model for

global containerized and bulk vessel flow estimation. *Maritime Transport Research*, *2*. https://doi.org/10.1016/j.martra.2021.100038

Lokras, A., Chakravarty, A., Rades, T., Christensen, D., Franzyk, H., Thakur, A., & Foged, C. (2022). Simultaneous quantification of multiple RNA cargos co-loaded into nanoparticle-based delivery systems. *International Journal of Pharmaceutics*, *626*. https://doi.org/10.1016/j.ijpharm.2022.122171

Meiliana, Daniella, G., Wijaya, N., Putra, N. G. E., & Efata, R. (2023). Agile Software Development Effort Estimation based on Product Backlog Items. *Procedia Computer Science*, *227*, 186–193. https://doi.org/10.1016/j.procs.2023.10.516

Michalides, M., Bursac, N., Nicklas, S. J., Weiss, S., & Paetzold, K. (2023). Analyzing current Challenges on Scaled Agile Development of Physical Products. *Procedia CIRP*, *119*, 1188–1197. https://doi.org/10.1016/j.procir.2023.02.188

Mishra, A., & Alzoubi, Y. I. (2023). Structured software development versus agile software development: a comparative analysis. *International Journal of System Assurance Engineering and Management*. https://doi.org/10.1007/s13198-023-01958-5

Narayanan, S., & Antoniou, C. (2022). Electric cargo cycles - A comprehensive review. *Transport Policy*, *116*, 278–303. https://doi.org/10.1016/j.tranpol.2021.12.011

Njoya, E. T., Forsyth, P., Niemeier, H.-M., & Nikitas, A. (2023). Examining the impact of air cargo growth on poor Vietnamese rural and urban households. *Transport Economics and Management*, *1*, 112–125. https://doi.org/10.1016/j.team.2023.08.001

Paasivaara, M., Behm, B., Lassenius, C., & Hallikainen, M. (2018). Large-scale agile transformation at Ericsson: a case study. *Empirical Software Engineering*, *23*(5). https://doi.org/10.1007/s10664-017-9555-8

Polkinghorne, M., Pearson, N., van Duivenvoorde, W., Nayati, W., Tahir, Z., Ridwan, N. N. H., Forrest, C., Tan, N. H., Popelka-Filcoff, R., Morton, C., Kowlessar, J., & Staniforth, M. (2024). Reuniting orphaned cargoes: Recovering cultural knowledge from salvaged and dispersed underwater cultural heritage in Southeast Asia. *Marine Policy*, *163*. https://doi.org/10.1016/j.marpol.2024.106074

Soprano, E., Migliavacca, M., López-Ferreiro, M., Pelaz, B., Polo, E., & del Pino, P. (2023). Fusogenic Cell-Derived nanocarriers for cytosolic delivery of cargo inside living cells. *Journal of Colloid and Interface Science*, *648*, 488–496. https://doi.org/10.1016/j.jcis.2023.06.015

Jurnal Ekonomi
Volume 13 , Number 01, 2024, DOI 10.54209/ekonomi.v13i01
ESSN 2721-9879 (Online)
https://ejournal.seaninstitute.or.id/index.php/Ekonomi

Tøndel, I. A., Cruzes, D. S., Jaatun, M. G., & Sindre, G. (2022). Influencing the security prioritisation of an agile software development project. *Computers and Security*, *118*. https://doi.org/10.1016/j.cose.2022.102744

Tseremoglou, I., Bombelli, A., & Santos, B. F. (2022). A combined forecasting and packing model for air cargo loading: A risk-averse framework. *Transportation Research Part E: Logistics and Transportation Review*, *158*. https://doi.org/10.1016/j.tre.2021.102579

Yang, H., Landes, H., & Chow, J. Y. J. (2023). A large-scale analytical residential parcel delivery model evaluating greenhouse gas emissions, COVID-19 impact, and cargo bikes. *International Journal of Transportation Science and Technology*. https://doi.org/10.1016/j.ijtst.2023.08.002

Yıldız, B., Savelsbergh, M., & Dogru, A. K. (2023). Transshipment network design for express air cargo operations in China. *EURO Journal on Transportation and Logistics*, *12*. https://doi.org/10.1016/j.ejtl.2023.100120