



JOURNAL OF MARITIME LOGISTICS

Universiti Malaysia Terengganu



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eISSN: 2805-5195 Journal homepage: <https://journal.umt.edu.my/index.php/jml/index>

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To cite this article: Muhammad Syazwan Ramlan & Nik Nurhalida Nik Hariry (2023): The Evolution of Cargo Ships in The Malaysian Maritime Industry,
Journal of Maritime Logistics
DOI: <https://doi.org/10.46754/jml.2023.12.003>

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THE EVOLUTION OF CARGO SHIPS IN THE MALAYSIAN MARITIME INDUSTRY

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ABSTRACT

The shipping industry's growth in Malaysia has led to a significant increase in ship emissions, impacting air and marine quality and posing risks to human health, climate, and ecosystems. To address these environmental challenges, this research paper examines the implementation of a zero-emission shipping policy in Malaysia. The objectives of this study are to identify the impact of such a policy on the country's shipping industry for the successful implementation of the zero-emission policy. Qualitative methodology was employed and interviews were conducted with the Marine Department Malaysia (MDM) to gather insights and data. Content analysis was applied to analyze the interview results. This research contributes to addressing the shipping industry's sustainability challenges in Malaysia by providing insights into the implementation of a zero-emission policy.

Keywords: Zero-emission, shipping policy, maritime industry, carbon emissions reduction, content analysis.

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Introduction

The main goal of the International Maritime Organization's creation is to promote a complete regulatory framework for shipping. Currently, its jurisdiction includes legal matters, marine safety, environmental awareness, safety issues, technical cooperation, and shipping efficiency (Samir Mankabady, 1986). Malaysia has more than 600 industrial areas with world-class infrastructure and excellent connections. Malaysia's position as a strategic maritime country has been a catalyst for the development of the trade industry for centuries. (Jati, Hanizah. Hj. Idriz, 1998). The main port cities in this region functioned as focal points for colonists and their governments. Ships came from all over the world due to the monsoon wind

system, which blows differently in summer and winter. When there was no wind between the two seasons, the ships had to anchor in ports where there was an opportunity to trade. In such a maritime business environment, ships, and boats undoubtedly played an important role, and Malay maritime traders have used various vessels to conduct trade since the beginning. Three different types of Malay ships, including large vessels intended for oceanic and intercontinental exploration, were used in trade and marine operations throughout antiquity (Musa, 2014).

Literature Review

Ancient Malay civilisation had a maritime culture because of its location in the Malay Archipelago, which was at the crossroads of sea trade between the Western and the Eastern world. In addition, the Malay Archipelago was home to the Malay people. The settlements and administrations established were both based on the principal port cities in the region. As a result of the system of monsoon winds blowing in different directions during

the summer and winter and the absence of wind between the two seasons, the ships came from various directions. When there was no wind, ships were forced to stay in harbours that provided opportunities for traders to conduct their business. In an environment characterised by maritime trade, ships, and boats played a significant part, and ever since the commencement of maritime trade, Malay traders have utilised a wide variety of ships to carry out their business. Two forms of legacy Malay ships were employed in trade and marine activities in the past. They are the huge ships known as *Jong* and *Ghali*, and they were utilised for exploration of the great oceans and between continents (Musa, 2014).

This development demonstrates that the size of vessels has expanded to ensure that economies of scale are maintained in the shipping of containers via maritime transport. The objective to achieve economies of scale has become the driving element behind the development of vessels with capacities greater than 18,000 TEU over the past 20 years (Parola *et al.*, 2016). Maritime travel has advantages and downsides. The type of commodities being carried, the distance, time, and cost restrictions, as well as the need for security and control of the items, all influence the mode of transportation chosen. To transfer people and commodities throughout the world, both sea and air transportation continue to be crucial to the global economy and supply chain (Cons, 2022).

The term "Shipping Revolution" refers to a time during which significant technological advancements were made in the field of maritime transportation. It was at this time that new ship designs, improved propulsion systems, and enhanced navigational equipment were developed. This advancement in shipping technology made it possible for vessels to go further and faster, which facilitated the development of global commercial networks

and a rise in economic activity. Square sails and forward-and-aft sails were the primary means of propulsion of ships during the American Revolution. Establishing a cable network that linked far-flung ports made it possible for global trade to take place in real-time and led to an increase in the total number of ships in operation. For ages, ships have been essential for a variety of endeavours including trade, conflict, migration, colonialism, and scientific research. The Shipping Revolution was an important turning point in maritime history (Monday & Stopford, 2000).

The evolution of cargo ships in Malaysia has been closely tied to the country's economic development. As Malaysia's economy grew and its trade with other countries expanded, the need for more efficient and larger cargo ships increased. In the early 20th century, traditional wooden ships were the main form of transportation for goods. These ships were relatively small and slow, and could only carry a limited amount of cargo. They were mainly used for coastal trade, and the cargo they transported was primarily agricultural products such as rubber and tin (Abdullah Yusuff Basiron, 2023).

Six Types of Cargo Ship and Development

Throughout history, shipping has been an important activity, particularly in places where prosperity was predominantly dependent on international and interregional trade. One of the four cornerstones of globalisation is trade liberalisation, along with communications, international standardisation, and transportation. The other cornerstone is international standardisation (Kumar & Hoffmann, 2002). The Shipping Revolution was a period of great technological advancement in maritime transportation. It saw the introduction of new ship designs, more efficient propulsion systems, and improved navigational tools. This revolution in

shipping allowed ships to travel farther and faster, allowing for global trading networks and increased economic activity. Ships of the American Revolution relied on square sails and fore-and-aft sails for propulsion. The introduction of the cable network, which connected distant ports, enabled real-time global trade and increased the number of ships in circulation. Ships have supported exploration, trade, warfare, migration, colonisation, and science for centuries, and the Shipping Revolution was an important milestone in maritime history (Karanassos, 2016)

Dry Bulk Carriers

Dry products like coal, grain, and cement are transported by these types of vessels. They are equipped with big cargo holds and sophisticated machinery to load and unload freight quickly and efficiently. A type of commercial ship known as a bulk carrier was developed to carry unpackaged goods. These kinds of freight often consist of components that are powdered, granulated, or loose and are transported in substantial amounts. Cargo holds on bulk carriers are specifically intended to accommodate large quantities of cargo, and they are normally situated on the ship's middle and lower decks (Leschiutta, 2021).

Container Ships

These vessels are designed to transport shipping containers, which can be filled with a variety of goods. They have cranes and other specialised equipment for loading and unloading the containers. Containers have emerged as the preeminent mode of shipment of manufactured goods all over the world. Containers can hold a wide variety of things, including meals, electrical equipment, and even automobiles. In addition, liquids, and cargo that must be kept cool can be transported using them (Leschiutta, 2021).

Tankers

A tanker is a type of cargo ship that is designed to transport liquids or gases in bulk, such as crude oil, refined products, chemicals, liquefied natural gas, and liquefied petroleum gas. They are typically larger than other types of cargo ships as they are designed to carry large volumes of liquid or gas. Oil tankers are used to transport crude oil from oil fields to refineries. Product tankers are used to transport refined products, such as gasoline, diesel, and jet fuel. Chemical tankers are used to transport chemicals, such as acids and other hazardous materials. Liquefied natural gas (LNG) tankers are used to transport liquefied natural gas. Liquefied petroleum gas (LPG) tankers are used to transport liquefied petroleum gas. These ships are built and equipped with special features that allow them to transport their cargo safely, such as reinforced tanks, special pumps, and safety equipment (Leschiutta, 2021).

Roll-on/Roll-off (Ro-Ro) Ships

These vessels are used to transport vehicles and other roll-on/roll-off cargo, such as trucks and trailers. They have ramps and other specialised equipment for loading and unloading the cargo. When in port, RORO ships have ramps or ferry slips that allow vehicles to be efficiently rolled on and off the vessel. The term "RORO" refers to large ocean-going vessels designed to transport many vehicles, heavy equipment, and other rolling cargo (Dalsøren, 2009).

Multi-Purpose Ships

These vessels are designed to transport a variety of different types of cargo, such as containers, bulk goods, and vehicles. They have a combination of features from the other types of cargo vessels. A multi-purpose vessel, also known as an MPV, is a specific kind of cargo ship that is intended to transport a diverse range of goods, including bulk cargo, bulky cargo, rolls of paper, and building materials like wood and steel. They can be separated into the following

four categories: Vessels with cargo gear, vessels without cargo gear, coastal trade liners, and vessels that travel between the sea and rivers (Dalsøren, 2009).

Passenger Ship

A passenger ship is a type of merchant ship whose primary function is to carry passengers at sea (Karanassos, 2016). They are designed to transport large numbers of people and typically have accommodations for passengers, such as cabins, lounges, dining areas, and other amenities

Methodology

This study aims to analyse and identify the impact of the evolution of large cargo ships in the Malaysian maritime industry. The research design is important to achieve quality research. Research design is a procedure of data collection, analysis, interpretation, and reporting of the data (Creswell & Clark, 2007). The research design selection depends on the availability of resources, philosophy for the research, research questions, and research objectives. Semi-structured interviews are the method in this study. Main data are defined as those that are collected from the primary or original source (Yusof, 2003). The main data was collected at the research location itself, and the raw data was

analysed to get the findings. Usually, the researcher will travel to the study location to identify informants who can answer the research questions properly, such as using interviews or observation techniques. (Situ Morang & Muslich, 2014). Secondary data, as defined by Marican (2005), are data that were gathered by researchers in the past and are already in circulation. This indicates that previous researchers have collected all the relevant data for a study, either by data collection in the field or through some other approach that was deemed suitable (Ang Kean Hua, 2016).

This study will be conducted by interviewing six informants who had worked or are currently working in a shipbuilding company. The informants consisted of men and women of different ages. They were chosen because they were experienced working in shipbuilding companies. Table 1 below shows the profile of every informant. The informants had the relevant knowledge to identify the impact of the evolution of large cargo ships and the benefits to the Malaysian maritime industry. The study used a qualitative research method, specifically interviews, to collect data from the informants. The researcher conducted face-to-face or online interviews, depending on the preferences of the informant. The researcher asked about the informant's experiences and perceptions of the

evolution of large cargo ships and their impact on the maritime industry in Malaysia.

Table 1: Informants profile

No.	Code	Experiences (years)	Rank	Gender
1	RO1LP	28	Operation manager	Men
2	RO2LP	28	Operation manager	Women
3	RO1MISC	21	Captain	Men
4	RO2MISC	18	Navigation officer	Men
5	RO1JO	30	Chief engineer	Men
6	RO2JO	21	Second engineer	Men

Source: Authors

Results and Discussion

This section discusses the findings that were based on the results of the analysis. The focus of this research is to find out about “The Evolution of Cargo Ships in The Malaysian Maritime Industry”. The latest technology has made great progress towards reducing

ship sizes or developing large autonomous vessels. These increasingly large cargo ships have impacted world trade. Therefore, this research aims to analyse whether this cargo ship revolution is beneficial to the Malaysian maritime industry and identify the impact of the large cargo ship revolution in the Malaysian maritime industry. Table 2

shows the topic from the interview.

Table 2: The significant topic of the evolution of cargo ship

Developed Themes	Topic
Revolution of cargo ships	Revolution
The impact of AI Technology on Malaysia's maritime industry	Impact
Benefits for Malaysia's maritime industry	Benefit
The impact of the large cargo ship revolution	Cargo ship
The development of large cargo ships in the Malaysian marine industry	Large cargo

Source: Authors

Revolution of Cargo Ships

Throughout the interviews, all the informants agreed on the theme of the revolution of cargo ships. For instance, several informants said that ‘this revolution is a change in the structure of the organisation which is new in terms of things, like from the old system to a new system’ (RO1LP), and ‘the available waves whether or not it is very helpful because in the past we had to plot the chart manually, but after the existence of the system it is no longer necessary because it will plot at every moment instead of every five minutes’ (RO2MISC). The revolution of cargo ships would improve seafarers’ understanding of their jobs, regardless of the areas designated for work, and would also allow those workers to provide adequate output levels.

The Impact of AI Technology on Malaysia's Maritime Industry

80% of informants agreed that AI (Artificial Intelligence) technology will impact cargo

ship evolution. According to the informants, there have been positive and negative impacts on Malaysia's maritime industry. For example, ‘I believe AI will have an impact on the marine department.’ (RO1MISC) and ‘Human progress is tearing this thing apart, and more and more job opportunities will be lost as a result.’ (RO2MISC).

Seafarers and marine sector personnel may discover that using any technology is difficult for them; therefore, they must continue getting accustomed to using technology.

Benefits for Malaysia's Maritime Industry

According to the interview sessions that were carried out, 90% of the informants agreed that the evolution of cargo ships can improve Malaysia's maritime industry. An informant (RO2JO) said, ‘As I previously stated, the benefits of this revolution include the ease with which we can transport large quantities of goods to any trading location in the world’. Additionally, RO2LP stated that ‘We have to rely on our Board after 50%

utilisation of BOR (Berth Occupancy Ratio) reaches 70% and we have to have another port up and running okay or it needs to be enlarged. We used to bring 10-tire trucks from Kuala Lumpur, but now we have 12-tire, 16-tire, and 18-tire trucks because the roads all have to be big'. The Malaysian maritime cluster is made up of numerous industries overseen by multiple government authorities, demonstrating the industry's strength and diversity.

The Impact of the Large Cargo Ship Revolution

70% of the informants approved of the impact of the large cargo ship revolution on the industry. The synergistic interplay of reduced costs, heightened efficiency, and containerisation/automation has catalysed a global trade boom (RO2LP). Lower transportation costs and expedited delivery times have increased the viability of international business ventures, fostering market expansion and diversified supply chains. This surge in trade volume has, in turn, led to the concentration of services and cargo at strategic mega ports and logistics hubs equipped to handle the immense throughput. While this concentration amplifies efficiency gains, it also necessitates proactive management to mitigate potential drawbacks, such as infrastructural strain and environmental concerns in these focal areas. Ensuring

the continued prosperity of a globally interconnected trade system hinges upon effectively governing this concentration, safeguarding economic and environmental well-being.

The Development of Large Cargo Ships in the Malaysian Maritime Industry

Throughout the interviews, all informants agreed with the theme that the development of large cargo ships was beneficial. Malaysia's maritime ambitions for Very Large Container Ships (VLCVs) rely on a synergistic convergence of three critical factors: Upgraded port infrastructure, robust ship repair and maintenance facilities, and comprehensive logistics and support services (RO2LP). These elements are not distinct entities but rather intertwined threads in a complex tapestry required for attracting and servicing the maritime industry (RO1MISC).

The Evolution of Cargo Ships

This section summarises the theme of cargo ships' evolution. Based on research findings, the evolution of cargo ships would have five themes, which are the revolution of cargo ships, the impact of AI technology on Malaysia's maritime industry, benefits for Malaysia's maritime industry, the impact of the large cargo ship revolution, the development of large cargo ships in the Malaysian maritime industry. Figure 1

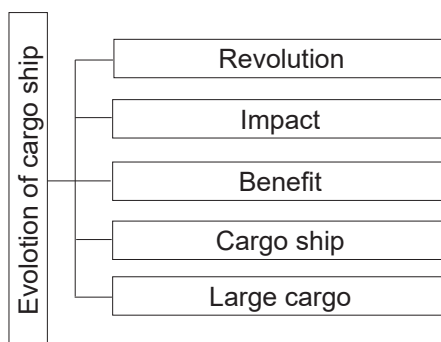


Figure 1: The evolution of cargo ship themes

Source: Authors

graphically depicts the research findings for this section.

Conclusion and Implication

Overall, this study aims to find and learn about The Evolution of Cargo Ships in the Malaysian Maritime Industry. In addition, this study also analyses whether this cargo ship revolution is beneficial to the Malaysian maritime industry and identifies the impact of the evolution of large cargo ships in the Malaysian maritime industry. Based on the analysis that has been done, the researcher can also identify the causes of this cargo shipping revolution to people, socio-politics, the economy, and the country.

Therefore, the benefits of this cargo shipping revolution in a country, as well as its good and bad effects, were identified. In addition, the researcher can also describe the type of ship from the past to the present in terms of its function, use, and capability. The results of the study also found that the development of cargo ships has many benefits to the country, but it will also change people's daily lives. It cannot be denied that with this shipping revolution, it is not impossible to have a revolution in other things as well.

Overall, this study was able to meet its goals of identifying the effects of this shipping revolution on people as well as the positive effects on the Malaysian maritime industry. The researcher has also stated some suggestions and recommendations for future researchers to focus on.

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