

# Malaysia's Maritime Transport Sector Impacts on Economy: An Input-Output Analysis

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## Abstract:

The Ministry of Transport Malaysia released the Malaysia Shipping Master Plan 2017-2022 and recently an improvised version with the aim of strengthening and revitalising the country's maritime transport sector. However, although the master plan has been in place for 6 years, there is no examination of the impacts of the implementation of this master plan. Thus, this study aims to analyse the impacts of maritime transport economics in Malaysia based on the said document and available data. This study adopts the input-output analysis using data from Input-Output Table Malaysia from 2010 to 2020. It is found by this study that the maritime transport sector has the potential to accelerate during the economic recovery phase. Authorities would be able to use these findings to improve maritime transport performance based on the case study of the Malaysian maritime transport sector. Also, this study can be used as a way forward for policymakers in Malaysia's maritime-related agencies to develop their own strategies to minimise the impacts of any future pandemic on the maritime transport sector.

**Keyword:** Maritime Transport, Input-Output Analysis, Multiplier, Value-Added, Linkages

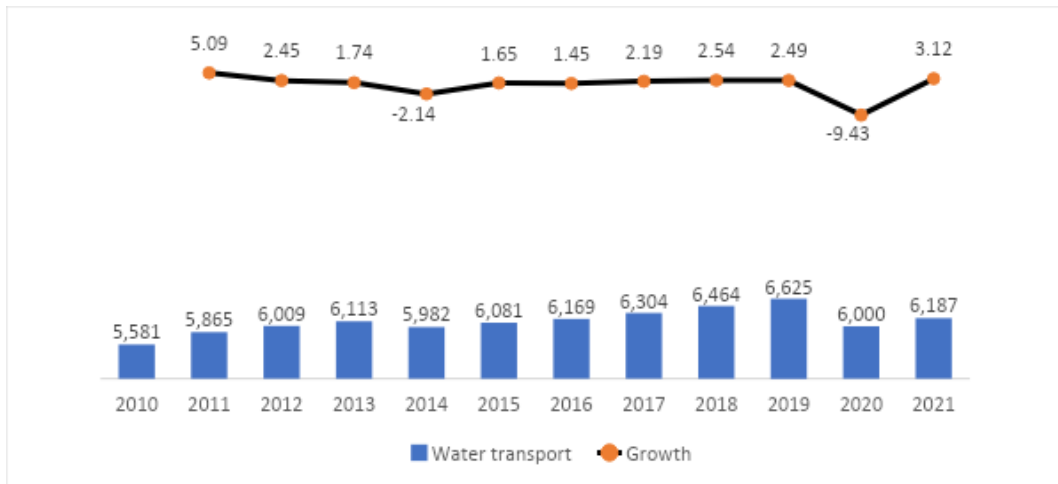
## Introduction

Maritime transport is the most important form of international trade, accounting for over 80% of the world's total merchandise trade (UNCTAD, 2021). Maritime transport is essential to the global economy as it enables the movement of goods, materials, and resources across international borders. Maritime transportation involves the transportation of goods from one port to another by sea, which includes the movement of containerised cargo, bulk cargo, and crude oil. The vast majority of global trade involves maritime shipping, as it is the most efficient form of transportation for large shipments, and it is also the most cost-effective form of transportation for goods that need to be shipped over long distances (Across Logistics, 2022). It is estimated that there are over 50,000 merchant ships from 150 nations and manned by almost 2 million seafarers (International Chamber of Shipping, 2021).

The Malaysian government has made significant investments in infrastructure, technology, and human resources to ensure the growth and development of its maritime industry (Hup, 2021). Malaysia focuses on the development of its shipping industry, with an emphasis on the expansion of its fleet and the enhancement of its competitiveness. The country has a significant shipbuilding industry, which produces a range of vessels, including bulk carriers, tankers, and container ships. Malaysia's maritime transport sector also plays a crucial role in the country's international trade as a major exporter of commodities, including oil, gas, and palm oil, and its ports serve as critical gateways for the movement of goods to and from the rest of the world.

Malaysia has set its sights on becoming a dominant force in the maritime transport sector, thus in pursuit of this goal, the Ministry of Transport released the Malaysia Shipping Master Plan 2017 – 2022 (Ministry of Transport, 2017), aimed at tackling the challenges facing the shipping industry and bolstering its strength and competitiveness. This plan outlines the necessary actions and strategies that the government and industry must take to ensure continued success beyond 2020. While posing its waves in the global shipping arena, Malaysia maritime transport has shown significant increases of the Gross Domestic Products (GDP) between 2010 and 2021 as shown in Figure 1 except for 2014 and 2020.

**Figure 1:** Malaysia maritime transport GDP (RM Million) and growth (%), 2010-2021



Source: Department of Statistics Malaysia (, 2021)

However, despite the positive growth in Malaysia maritime transport, the main reason that explains the positive development is still unknown. Also, Figure 1 also is not capable of explaining the contribution of Malaysia maritime transport to other sectors. With also less studies that examine the impact of implementation of Malaysia Shipping Master Plan, this study aims to analyse the impact of maritime transport towards Malaysia's economy. using input-output analysis as the methodology for this research.

## Literature Review

### Maritime Transport Challenges

Maritime transport economy is an essential part of international trade while maintaining mobility, keeping valuable resources in circulation, and growing international markets. The maritime transport sector has also made incredible strides in technology, safety, and efficiency to make strides in growth, while also implementing safety, environmental and labour standards to ensure sustainability. This is supported by Bagoulla & Guillotreau (2020) who note that maritime transport has become increasingly complex and facing various challenges due to numerous regulations focusing on safety and environmental protection. Since Regulations related to labour and trade are less common, Bagoulla & Guillotreau (2020) claim that the shipping industry struggles to comply with the regulations caused by the complexity and cost of compliance, leading to increased costs for the industry. Bagoulla & Guillotreau (2020) also identify a lack of coordination between different regulatory bodies as a major challenge for the industry, hence suggesting that the shipping industry must be able to adapt to the changing regulatory environment in order to remain competitive and profitable.

Although Malaysia is recognised as a maritime nation that relies heavily on maritime shipping for its economic growth, Malaysia is hindered by the lack of adequate infrastructure, which limits the number of vessels that can arrive at ports (Saharuddin, 2001). Furthermore, there is a lack of navigation aids and safety equipment, leading to accidents at sea. Additionally, there are limited resources available for maritime shipping, such as oil and gas, thus leading to higher costs for maritime shipping. The Malaysian government has also not implemented adequate regulations for maritime shipping, which can lead to increased illegal activities at sea. Lack of skilled personnel in the maritime industry is also alarming which can lead to a lack of qualified workers to operate ships.

### Maritime Transport Advantages

Even so, maritime transport also possesses some additional advantages compared to other sectors. According to Arof and Nair (2017), the advantages of maritime transport include the ability to

transport large quantities of goods, low operating costs, long-term cost savings, and high level of safety and security. As one of the most environmentally friendly modes of transport, maritime transport produces fewer emissions and requires less energy, hence reducing the cost of goods and services due to its low cost of operation and lack of tariffs and taxes. The flexibility and reliability offered by maritime transport can also be beneficial for businesses by allowing them to meet customer demands quickly and efficiently.

## Methodology

### Input-Output Analysis

Input-output (IO) analysis offers a reliable statistical foundation for analysing inter-industry transaction tables. These tables can be used to develop mathematical relationships by utilising the Leontief inverse matrix. In an IO analysis, a specific economy is divided into productive sectors which are represented by columns indicating input values and rows representing output values. By using the principal equation of the IO model, the IO analysis allows to determine the impact of cross-sector flows on overall production of each sector. This process allows the collection of valuable insights into the interdependent relationships between industries and their contribution to the economy (Miller and Blair, 2009). The equation of the IO model is as follows:

$$x_i = \sum z_{ij} + f_i \quad (1)$$

Where  $x_i$  is a total output of sector  $i$ ,  $z_{ij}$  represents the number of a product from sector  $i$  used as an intermediate input in production by sector  $j$ , and  $f_i$  represents a final demand of sector  $i$ , for  $i, j = 1, \dots, n$  ( $n$  is a number of sectors). This equation represents a system of linear equations, one per sector of the economy, where the output of each sector is divided between intermediate products and final demand. The relation between inputs used by sectors and the total produced output is determined by with technical coefficients  $a_{ij} = \frac{z_{ij}}{x_j}$ . By using simple matrix notation, the system of Equation (1) for the total economy, it is possible to rewrite it as

$$x = Ax + f \quad (2)$$

The Equation (2) can be rewritten as

$$(I - A)x = f \quad (3)$$

Where  $I$  is the identity matrix, and  $(I - A)$  and is called the Leontief matrix. The solution to this system of linear equation is

$$x = (I - A)^{-1} = f \quad (4)$$

Where  $L = (I - A)^{-1}$  represents the Leontief inverse matrix or multiplier matrix. This matrix can be interpreted as the relation of direct and indirect requirements for the output of each sector to support one unit of deliveries to the final demand, and its defined by elements  $a_{ij}$ .

## Result

Table 1 shows the structure of final demand of maritime transport between 2010 and 2020. It shows that the private consumption of maritime transport decreased from 30.02% in 2010 to 4.54% in 2015. However, it recovers by 35.63% and 33.82% in 2019 and 2020, respectively.

**Table 1:** Structure of maritime transport final demand, 2010-2020 (RM Million)

	2010	Share (%)	2015	Share (%)	2019	Share (%)	2020	Share (%)
Private Consumption	2,888,380	30.02	332,923	4.54	3,487,430	35.63	2,443,973	33.82
Government Consumption	-	-	12,100	0.16	17,127	0.17	16,850	0.23
Gross fixed capital formation	384	0.00	151,158	2.06	492,482	5.03	518,319	7.17
Change in inventory	253	0.00	0	0.00	0	0.00	0	0.00
Exports	6,733,940	69.98	6,841,247	93.24	5,791,877	59.17	4,246,308	58.77
Total	9,622,958	100.00	7,337,427	100.00	9,788,917	100.00	7,225,450	100.00

Table 2 illustrates the structure of maritime transport production input. Production input is a method used in economics to measure the interdependence of different sectors in the economy by analysing how inputs from one sector are used as inputs in the production process of other sectors. The production of any good or service relies heavily on inputs in order to produce output. These inputs, also known as resources, can include land, labour, and capital. Land can refer to both physical resources and the environment, while labour can refer to the physical and mental effort of employees. Capital includes all of the money, machines, and materials used in production (Kitzes, 2013).

**Table 2:** Structure of maritime transport production input, 2010-2020 (RM Million)

		2010	Share (%)	2015	Share (%)	2019	Share (%)	2020	Share (%)
1	Domestic intermediate inputs	5,956,708	49.07	9,611,971	59.04	10,665,623	60.81	8,873,069	59.00
2	Imported intermediate inputs	1,495,264	12.32	653,588	4.01	602,105	3.43	437,063	2.91
3	Taxes on products	111,668	0.92	109,000	0.67	145,667	0.83	111,079	0.74
4	Subsidies on products	193,591	1.59	17,749	0.11	17,845	0.10	5,812	0.04
5	Value added	4,768,250	39.28	5,922,677	36.38	6,144,999	35.03	5,623,898	37.39
a	Compensation of employees	971,311	8.00	1,549,437	9.52	1,933,052	11.02	1,856,233	12.34
b	Other Net Taxes on Production	3,589	0.03	78,430	0.48	55,656	0.32	- 37,689	- 0.25
c	Operating surplus	3,793,350	31.25	4,294,810	26.38	4,156,291	23.70	3,805,353	25.30
	Total	12,138,299	100.00	16,279,487	100.00	17,540,549	100.00	15,039,296	100.00

## Output Multiplier

Table 3 shows the output multipliers and the inter-industrial impact of the maritime transport sector. The result can be interpreted as the increase in the demand of output from the maritime transport sector in Malaysia by RM 1 million will increase output in the Malaysia economy by RM 2.09 million. In 2010, the maritime transport output multiplier was 1.89 (the 6<sup>th</sup> highest). This is because at that time, Malaysia's economy was being impacted by the financial crisis of 2008. However, between 2015 and 2020, the output multiplier of the maritime transport sector remains relatively stable (refer Table 3) and become top 3 ranked in Malaysia economy sectors. According to Bagoulla and Guillotreau (2020), in 2010, the maritime transport sector has strong sensitivity to the international business conditions thus causing sluggish impact toward the economy. However, during the COVID-19 pandemic, the maritime transport sector was relatively stable since during that time there was high demand for maritime transport services.

**Table 3:** Output Multipliers

	2010		2015		2019		2020	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Agriculture, Fishery and Forestry	1.5144	15	1.3500	16	1.3659	16	1.3695	16
Mining and Quarrying	1.1954	17	1.2949	17	1.2686	17	1.2867	17
Manufacturing	1.7855	10	1.9520	4	1.9777	5	2.0841	4
Electricity, Gas & Maritime	1.5572	13	1.6940	11	1.6435	10	1.7152	8
Construction	1.9031	4	2.0310	3	2.0530	3	2.1046	2
Wholesale and Retail Trade	1.5429	14	1.5843	12	1.5636	12	1.6106	11
Hotel and Restaurants	1.8511	8	1.8543	7	1.8609	7	1.9684	7
Land Transport	1.8801	7	1.8828	6	1.9670	6	2.0305	6
<b>Maritime Transport</b>	<b>1.8851</b>	<b>6</b>	<b>2.0779</b>	<b>1</b>	<b>2.1071</b>	<b>2</b>	<b>2.0885</b>	<b>3</b>
Air Transport	2.0221	2	2.0758	2	2.1752	1	2.3533	1
Other Transport Services	2.1063	1	1.9199	5	2.0068	4	2.0839	5
Port and Airport Services	1.8868	5	1.5356	13	1.5750	11	1.5702	12
Highway, Bridge, Tunnel Operation Services and Other Communication Services	1.9036	3	1.7670	8	1.6784	9	1.7003	9
Finance and Insurance	1.8313	9	1.4941	14	1.4506	14	1.4489	14
Real Estate and Ownership of Dwellings	1.5837	12	1.3981	15	1.4299	15	1.4359	15
Business and Private Services	1.5971	11	1.7166	9	1.7001	8	1.6815	10
Government Services	1.5084	16	1.6956	10	1.4760	13	1.5030	13

## Conclusion

The aim of this study in analysing the impacts of maritime transport economics in Malaysia between 2010 and 2020 has been successfully achieved. The findings show that Malaysia's output multiplier is at top 5 between 2015 and 2020, indicating that maritime transport has potential to give positive investment between RM 2.077 million and RM 2.11 million if RM 1 million investment is made. Interestingly, the output multiplier in Malaysia is higher compared to the average European figure of 1.6 for maritime transport (European Community Shipowners' Associations, 2020).

These findings are beneficial for Malaysia, especially towards the achievement of Malaysia Shipping Master Plan as one of the objectives of the master plan is to enhance Malaysia's attractiveness to shipping business. This finding will guide the policy makers in increasing the investment in

infrastructure of ports and effective government policies in projected continued growth at a rapid pace in the coming years.

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