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

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Maritime transport is the most important form of international trade that enables the movement of goods, materials, and resources across international borders, accounting for **over 80% of the world's total merchandise trade** (UNCTAD, 2021)

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There are over **50,000 merchant ships from 150 nations and manned by almost 2 million seafarers** (International Chamber of Shipping, 2021).

Ministry of Transport released the Malaysia Shipping Master Plan 2017 – 2022 aimed at tackling the challenges facing the shipping industry and bolstering its strength and competitiveness by outlining the strategies that the government and industry must take to ensure **continued maritime and shipping industry success beyond 2020**

Maritime transport challenges:
- **Complex** due to struggles to comply with the regulations (Bagoulla & Guillotreau, 2020)
- **Inadequate infrastructure** limits the number of vessels that can arrive at ports (Saharuddin, 2001)
- **Limited resources** e.g. oil and gas, leading to higher costs for maritime shipping
- **Lack of coordination** between different regulatory bodies (Bagoulla & Guillotreau, 2020)
- **Inadequate regulations implementation** leading to increased illegal activities at sea
- **Lack of skilled personnel**

Nevertheless, according to Arof and Nair (2017), maritime transport advantages include:
- the ability to **transport large quantities of goods**
- **low operating costs**
- long-term **cost savings**
- **high level of safety and security**
- one of the **most environmentally friendly** modes of transport
- **lack of tariffs and taxes**
- **flexible and reliable**
- **quick and efficiently**

Research Methodology

- Input-output (IO) analysis develop mathematical relationships by utilising the Leontief inverse matrix
- Methods:
    - Divide specific economy into productive sectors
    - Use columns to indicate input values and rows to represent output values
    - Use the principal equation of the IO model to determine the impact of cross-sector flows on overall production of each sector:

$$x_i = \sum z_{ij} + f_i \qquad \text{(Equation 1)}$$

- 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,
- f_i represents a final demand of sector i, for i,j=1,…, n (n is a number of sectors).

Research Methodology

- By using simple matrix notation, the system of Equation (1) for the total economy, it is possible to rewrite it as:

$$x = Ax + f \qquad \text{(Equation 2)}$$

- The Equation (2) can be rewritten as

$$(I - A)x = f \qquad \text{(Equation 3)}$$

- I is the identity matrix
- $I - A$ is the Leontief matrix

- The solution to this system of linear equation is:

$$x = (I - A)^{-1} = f \qquad \text{(Equation 4)}$$

Results

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	151,158	2.06	492,482	5.03	518,319	7.17
Change in Inventory	253	0	0	0	0	0	0	0
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**

Results

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**

Results

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
Maritime Transport	**1.8851**	**6**	**2.0779**	**1**	**2.1071**	**2**	**2.0885**	**3**
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

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Conclusion

- 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.
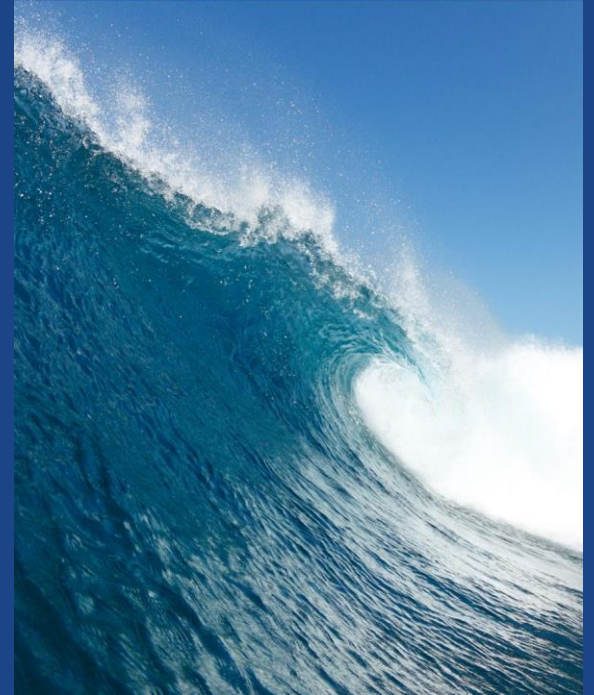
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Thank You

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