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Increasing Maritime Transport Volume in the direction of Enhancing Maritime Transport Market Share: Vietnam case study

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Abstract

Shipping universally accounts for 80% of global trade and 70% in price terms. While in Vietnam, not only the maritime transport market share, especially with international goods, has decreased significantly but also the maritime transport volume of national fleet tends to decrease. Therefore, the solutions of increasing the transport volume along with regaining the transport market share are a major concern for Vietnam's shipping development plan. With the purpose of finding these important solutions, this research aims at investigating the factors affecting the national fleet's transport volume by ARDL model based on Vietnamese fleet's transport volume quarterly data from 2008 to 2022. The results demonstrate that the deadweight tonnage of the fleet and GDP are the two fundamental factors which have positive influences on transport volume of Vietnamese shipping fleet in both the short run and the long run. Then, the paper proposes solutions how these two variables, especially the tonnage of the fleet increase the maritime transport market share as well. The findings provide clear directions to the policy makers and the shipping company in proposing relevant solutions for shipping development plan.

Keywords: Vietnam, national fleet, transport volume, tonnage, GDP.

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1. Introduction

Vietnam is strategically located in the center of Southeast Asia. Vietnam has a long coastline, up to 3200 kilometers, Vietnam's sea area lies in the important navigation lines between the Indian Ocean and the Pacific Ocean, currently the second busiest maritime route in the world. These make Vietnam a prime location for trading. More importantly, Vietnam accelerates international economic integration, Vietnam has been active in signing bilateral, multilateral trade agreements and maritime transport agreements with countries throughout the world. Trade (% of GDP) in Vietnam was reported at 186 % in 2021 (World Bank, 2022). This creates opportunities for the amount of imported and exported goods to increase. Specifically, the amount of goods through the seaport (both domestic and import-export) has been continuously increasing, reaching 724 million tons with 24.8 million teus in 2022 (nearly 5 times more than before joining WTO) with the seaport system being invested more and more synchronously and modernly to meet.

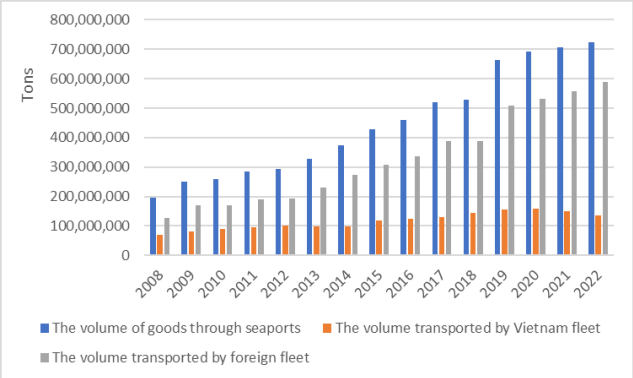

Figure 1: The volume of goods through seaports

(Source: Vietnam Maritime Administration)

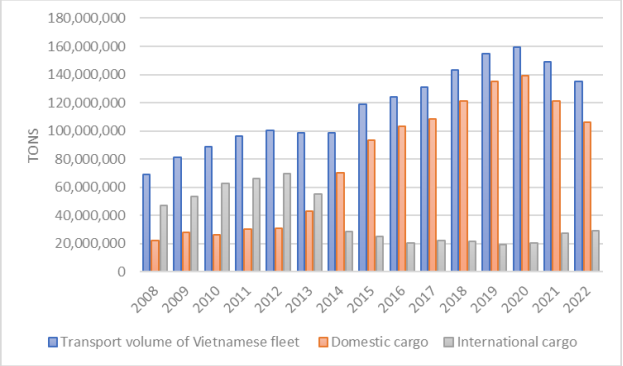

Figure 2: Transport volume of Vietnamese fleet

(Source: Vietnam Maritime Administration)

It is clear from the charts that the volume of goods through seaports (both domestic and import-export) continuously increases, however, the Vietnam's fleet is responsible for 35% in 2008 to only 18% in 2022, mainly operates on domestic routes and short routes in the intra-Asia region.

These statistics reveal the issue that in the domestics maritime transport, the transport volume increases annually with nearly 100% in transport market share. This is due to the protection of domestic transport according to the provisions of the Vietnam Maritime Code 2015, the entire volume of domestic goods transported by sea is reserved for Vietnamese shipping fleet. However, according to commitments in the EVFTA Agreement, from 2025, foreign shipping lines are allowed to partially participate in the domestic shipping market. What happens then. While in the international maritime transport, the transport volume fluctuates unstablely and the market share is decreasing from 11% in 2015 to 8% in 2016 and 2017, 7% in 2018, to 5% in 2019 and 2020 and reached 7% in 2021 (Vietnam Maritime Administration, 2022). Vietnam's fleet can only run short routes to China and Southeast Asia. Thus, how to increase the transport volume of national fleet (both domestic and international cargo) along with increasing the transport market share.

It can be said that an increase in both transport volume and transport market share (both domestic and international cargo) is an important goal in national shipping strategy. Because domestic maritime transport must develop strongly enough to serve as a basis for developing international maritime transport. More importantly, this reduces dependence on foreign fleet. Besides, reducing in shipping costs can reduce logistics costs and have effecitive logistics management, one of the main sources of formation of competitive advantages, both for individual enterprises and the whole economy (Madina, 2022).

Therefore, it can be affirmed that research on increasing the volume of goods transported, thereby increasing the transport market share, is an urgent issue for coastal countries. Regarding this issue, Nektarios (2020) suggested that a shock in world GDP had a positive effect on all categories of transported goods, with the magnitude of this effect being category-specific. The relations between gross domestic product (GDP) and maritime exports, maritime imports were also examined with case study of Turkey. Its results showed

GDP is the Granger cause of maritime exports, maritime imports (Ramazan, 2022). Or in another study on the relationship between air transport and GDP, it is found that the reciprocal causal relationship was more likely to prevail in less developed economies. For more developed economies, only one direction of the causality was recognised, which run from air transport to economic growth (Fangni and Daniel, 2020). While in Vietnam, there have been several studies on factors affecting the volume of goods transported by the national fleet, mainly use tonnage variable. Vu (2007) focused on the fleet with the factor loading coefficients to each type of vessel by Delphi method to improve maritime transport market share. Also, Spearman's Rank correlation coefficient was applied to indicate the fleet (tonnage, age & freight) have great influences on transport volume (Nguyen, 2018). Besides, Quang (2023) conducted a study examining the causality between air transport (passenger and cargo) and economic growth among regions in Asia. Results confirmed a bi-directional causality relationship in most regions of Asia. However, the study only confirmed a unidirectional relationship from economic growth to air passenger transport in South Asia and from economic growth to air freight in Central Asia and West Asia.

It is obvious that research on the impact of GDP on maritime transport volume have been carried out in the world in general and developed countries. Meanwhile, in Vietnam - a developing country with a small fleet size, there have been only studies on fleet tonnage affecting the volume of goods transported by sea. There have been no studies that have mentioned the GDP variable as well as the simultaneous combination of both GDP and fleet tonnage factors to the volume of goods transported. This study will fill this research gap.

With this backdrop, the aim of this paper is to estimate the relationships between economic growth (GDP) & the total tonnage of the fleet and transport volume of the fleet. This assessment is conducted by autoregressive distributed lag (ARDL) approach. This study also aims at providing the long run solutions to increase the maritime transport volume along with increase the maritime transport market share. Also, this paper contributes to decision-makers better understand the relations between investment and regaining transport market share.

The remainder of the paper is organized in following manner. Section 2 provides the data and method used in the study. The empirical results are outlined and discussed in section 3. Finally, a conclusion with some implications and recommendation on future research is mentioned in section 4.

2. Data and Method

2.1. Data

After reviewing the literature on factors affecting transport volume, the variables of total tonnage of national fleet and economic growth (GDP) are selected as dependent variables in this research while dependent variable is transport volume of national fleet.

All data included in this analysis is collected from the Vietnam Maritime Administration, World Bank and General Statistics Office of Vietnam. This study employs the quarterly time series data in the period of 2008 – 2022, when Vietnam became a full member of World Trade Organization. Results are calculated using Stata 64bit version 15.

Table 1: Descriptive Statistics

Var. Name	Mean	SD	Min	Max
Volume transport	2.91E+7	7506434	1.29E+07	4.38E+07
Tonnage	1755620	507619.1	979562.1	3884023
GDP	1365777	595955.9	373294.4	2765911

2.2. Method

One of the most effective way to measure the relationship between one dependent and several independent variables is multiple regression. Multiple regression investigates the strength of the relationship between a single dependent variable and multiple independent variables. In this study, the Autoregressive Distributed Lag (ARDL) approach, originally introduced by Pesaran and Pesaran 1997, developed by Pesaran and others (Pesaran and Shin, 1999; Pesaran et al., 2001), is used to investigate cointegration between variables in model. There are reasons behind using this technique. First, the ARDL model is useful in solving time series problems with taking sufficient number of lags to capture the data (Shrestha and Bhatta, 2018). Second, the ARDL method has advantages over other

approaches (Engle and Granger, 1987; Johansen, 1988; Johansen and Juselius, 1990) in the stability of the variables because some of variables in this study are stationary at level, whereas others are non-stationary (Shrestha and Bhatta, 2018). Besides, this technique allows to estimate simultaneously in both the short-run and the long-run parameters (Kyophilavong et al., 2013). Last but not least, this paper employs this method due to its statistical procedures in smaller sample sizes compared to VAR and VEC models (J.Duasa, 2010). Therefore, it can be said that ARDL is a flexible tool in multivariate time series analysis (Halil, 2000).

General form of ARDL model:

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^{n} \beta.\Delta Y_{t-i} + \sum_{k=0}^{n} \gamma.\Delta X_{1,t-k} + ... + \sum_{p=0}^{n} \phi.\Delta X_{m,t-p} + \sum_{m=1}^{n} X_m + \varepsilon_t$$

where:

i : the lag length of dependent variable

k,p : the lag length of independent variables

m : number of independent variables

β, γ : regression coefficients

ε_t : Random errors

$\Delta X, \Delta Y$: stationary variables

The form of ARDL model for this study to find out the short-run and the long-run relationship among variables as follow:

$$\Delta LVOLUME_t = \alpha_0 + \sum_{i=1}^{n} \beta.\Delta LVOLUME_{t-i} + \sum_{i=1}^{n} \gamma.\Delta LTONNAGE_{t-i} + \sum_{i=1}^{n} \phi \Delta LGDP_{t-i}$$
$$+ \beta_1 LVOLUME_{t-1} + \beta_2 LTONNAGE_{t-1} + \beta_3 LGDP_{t-1} + \varepsilon_t$$

where:

ΔL ( ) : stationary variables

L() : logarit variables

$\beta, \gamma, \phi, \beta_i$: regression coefficients

3. Results and Discussion

3.1. Stationary tests

A stationary time series is a necessary step in estimation process in economics. A time series is called stationary when the mean, the variance, the covariance is constant over all times (Gurajati, 2003). In fact, most of the time series are non-stationary (Ramanathan, 2002). However, it is possible to convert them to a stable chain through a differential process. In this research, Unit Root Test, based on the extended Augmented Dickey Fuller (ADF) test (Nguyen and Nguyen, 2013) is applied to check stationarity of variables.

Table 2: Unit Root Test

Var. name	ADF test for unit root	P-value	Results
LnVL	-1.541	0.5132	non-stationary
LnTN	-0.260	-0.260	non-stationary
LnGDP	-2.364	0.1520	non-stationary
First Difference			
ΔLnVL	-4.207	0.0006	stationary at 5%
ΔLnTN	-3.725	0.0038	stationary at 5%
ΔLnGDP	-4.381	0.0003	stationary at 5%

The results indicate that all variables are stationary at the first difference.

3.2. Results of estimation

Table 3: The estimates of short and long run coefficients

	(1)	(2)	(3)
VARIABLES	**Long-term correction**	**Long-run**	**Short-run**
ΔLnVL$_{t-1}$			0.604***
			(0.131)
ΔLnTN$_{t-1}$			0.0524***
			(0.0178)
ΔLnGDP$_{t-1}$			0.0293**
			(0.0121)
LnTN$_{t-1}$		1.255**	
		(0.584)	
LnGDP$_{t-1}$		0.701***	
		(0.122)	
ECM$_{t-1}$	-0.0418**		
	(0.0183)		
Constant			-0.472
			(0.325)
Observations	56	56	56
R-squared		0.822	
Autocorrelation test		0.702	
Heteroskedasti -city Test		0.121	

(*, **, *** refers to stationarity at the level of significance of 1%, 5% and 10%, respectively)

According to the results in table 3, the LTN (LTONNAGE) and LGDP have a statistically significant effect on the LVL (LVOLUME) in both the short run and the long run. According to the estimation results, a 1% increase in the LTN increases the LVL by 0.0524% in the short run and 1.255% in the long run.

While a 1% increase in the LGDP increases the LVL by 0.0293% in the short run and 0.701% in the long run.

The results of the residual autocorrelation test show that the model has no autocorrelation (p-value of the coefficient test =0.702 >0.05). At the same time, the heteroskedasticity test shows that there is no relationship between the residuals and the independent variables. Therefore, the White test shows that there is no heteroskedasticity phenomenon (smallest p-value = 0.121 > 0.05).

3.3. Discussion

The above results indicate that both the total tonnage of national fleet and GDP have positive impacts on the transport volume of national fleet in the short and the long run. This study also discusses about the way these two variables affecting the transport volume. GDP is defined by the following formula: GDP = C + I + G + NX where C (C) represents private-consumption expenditures by households; Investment (I) refers to business expenditures by businesses and home purchases by households; Government spending (G) expenditures on goods and services by the government; and Net exports (NX) represents a nation's exports minus its imports (N.Gregory Mankiw, 2012). When GDP increases leading to an increase in consumption of economic actors (households or individuals, businesses, government and foreign entities). It means demand of goods and services increases consequently. Of course, this makes the transport volume (both the domestics and the international cargo) in the whole economy increase accordingly.

Regarding the total tonnage of the national fleet, this is an important variable in not only increase in transport volume but regaining the transport market share. The issue is that how to make growth of investment in the fleet's tonnage along with an increase in the transport market share.

First, this paper reviews the status of Vietnam's national fleet in recent years. In 2022, two types of ships, including general cargo ships and bulk cargo ships, account for the majority of Vietnam's shipping fleet (724 ships, 5.16 million DWT, respectively 70.2% of the number of ships and 48.6% of the total tonnage). The oil and chemical ship types rank the second in terms of number of ships and the first in total tonnage (4.94 million DWT, accounting for 46.57% of the total tonnage of the shipping fleet). The container ship has only 0.43 million DWT, accounting for 4.1% of the total tonnage. The type of liquefied gas ships accounts for a very small proportion (64 thousand DWT, equivalent to 0.6% of the total tonnage of the shipping fleet), achieving a growth rate of 100% in the last five years (increasing from 10 ships to 20 ships), however this ship type has the highest average ship age in the fleet (Vietnam Maritime Administration, 2022). Vietnam's fleet can only run inland waterway freight and short routes to China and Southeast Asia. The market share of transporting goods for export to Europe and America falls into the hands of foreign enterprises with large scale. The market share of imported goods is decreasing. Compared to the world, the world tends to develop larger ship sizes to optimize costs (the size of bulk and general cargo ships has tripled and the number of ships is twice larger than 20 years ago), especially the fleet of container ships and oil tankers has also been developed with very large ship sizes in the past four years (UNCTAD, 2021).

Second, the paper releases solutions of increase in total tonnage of the national fleet leading to increase in transport volume along with growth in transport market share. The shipping companies need to make suitable investment: (1) invest in specialized ships such as Bulk/bulk coal/sand/ grain/cement carrier, crude oil/chemical tankers LPG/ LNG carriers ...., (2) invest in large container ships, especially container ships running on international routes. Besides, on the part of government, investment mechanisms and policies need to be improved to attract businesses to invest in international fleet.

It is believed that with the growth of GDP and suitable investment in total tonnage of national fleet, not only the transport volume of national fleet will definitely increase but the transport market share will be regained as well.

4. Conclusion

Although in Vietnam, some studies have investigated the role of the fleet tonnage on the maritime transport volume, the GDP factor has not been mentioned. By filling this gap, this paper contributes to existing research by providing certain insights into how both the fleet tonnage and GDP affect the volume of maritime

transport in the context of Vietnam - a developing country with a small fleet size.

Firstly, the main finding from the empirical analysis is the significant of the tonnage of ship fleet and economic growth (GDP) in maritime transport volume. These co-integrated relationships are also confirmed in the Autoregressive Distributed Lag (ARDL) bounds test methodology developed by Pesaran et al. (2001) which involves the standard F-test.

Secondly, this study reveals the influence of these variables on transport market share, especially how to make a suitable investment in the tonnage of national fleet (specialized ships, large container ships & investment mechanisms and policies) to regain the transport market share (both the domestic and international cargo).

Despite this study's implications, there are limitations as well. This research uses the total tonnage variable which has not clarified the tonnage by ship types. This might limit the relevance of solutions to increase the transport volume along with increasing the transport market share. Indeed, it is recommended that the future research should use the tonnage variables by ship types with regression to examine the relations between transport volume and the tonnage of each ship type. This will definitely make the solutions for growth of transport volume and transport market share more relevant and reliable.

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