

# Macro-Economics Moderating the Effect of Supply Chain Management on Competitive Advantage and Firm's Performance in the Shipping Industry in Stock Exchange Indonesia

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## ABSTRACT

Destination This study is to test and analyze the effect of *Supply Chain Management* on *Competitive Advantage* , to test and analyze the effect of *Supply Chain Management* on *Firm's Performance* , to test and analyze the effect of *Competitive Advantage* on *Firm's Performance* , to test and analyze *Macro-economics moderating* on the effect of *Supply Chain Management* on a firm 's *Competitive Advantage* to test and analyze moderating *Macro-economics* on the effect of *Competitive Advantage* on a *firm's Performance* , to test and analyze moderating *Macro-economics* on the influence of *Supply Chain Management* on *Firm's Performance*.

The population in this study are shipping industry companies listed on the Indonesia Stock Exchange from 2013 to 2019 totaling 23 companies . Given that the population is heterogeneous in terms of financial statements published from 2013 to 2019, the researchers set the population criteria, namely companies that publish complete financial statements, after being selected with these criteria, the population that meets the criteria is 15 companies. Data analysis was carried out using the *Partial Least Square* (PLS) method chosen as an analytical tool in this study. The *Partial Least Square* (PLS) technique was chosen because this tool is widely used for complex causal - predictive analysis and is an appropriate technique for use in prediction applications and theory development as in this study.

In general, the conclusion from the results of this study is that *supply chain management* has a significant effect on the *competitive advantage* of companies engaged in the shipping industry listed on the Indonesia Stock Exchange from 2018 to 2019, so that the first hypothesis (H1 ) is proven true. *Supply chain management* and *competitive advantage* have no significant effect on the *firm's performance*, so that the second hypothesis (H2) and the third hypothesis (H3) are not proven true. *Macro -economics moderating is proven* to influence *supply chain management relationships* with *competitive advantage* , as well as the relationship between *competitive advantage* and *supply chain management* with *firm's performance*, so that the fourth hypothesis (H4), fifth hypothesis (H5), and sixth hypothesis (H6) have been proven true .

**Keywords:** *Supply Chain Management , Competitive Advantage Macro-economics and Firm's Performance*

## PRELIMINARY

Indonesia is referred to as a maritime country, which has the majority of its territory in the form of waters and islands. 70% of Indonesia's territory is dominated by territorial waters, while the archipelago reaches 17,504 islands spread from West to East. 17 thousands of islands throughout the archipelago are united by the ocean. Ships as connecting bridges play a key role in increasing inter-island connectivity.

By positioning maritime as a leading sector, it means that the government is aware that the use of the sea as a provider of natural resources and as a transportation medium is still minimal, starting from the number and quality of port facilities and infrastructure, transportation modes and routes and still has the potential to be further improved. Currently, the total number of ports in Indonesia, both commercial and non-commercial, is



1,241 ports, or the equivalent of one port serving 14 islands (14.1 islands/port) with an average area of 1548 km<sup>2</sup> /port. The condition of the infrastructure is still not balanced when compared to other archipelagic countries in Asia, for example: Japan, 3.6 islands/port and 340 km<sup>2</sup>/port; and the Philippines 10.1 islands/port and 460 km<sup>2</sup>/port.

The weakening of the national economy as a result of the weakening global economy also affected the domestic shipping industry. The Indonesian National Shipowners Association (INSA) noted that during 2015, the domestic shipping industry slumped due to the slowing rate of national economic growth. As a result, 15-20 percent of the approximately 14,000 units of Indonesian-flagged vessels are currently only parked and not working because there is no cargo (Beritasatu, 2015). In addition, throughout the first quarter of 2019, the shipping industry's performance was quite depressed due to skyrocketing world oil prices, falling coal prices, and tensions in the trade war between the United States (US) and China. Rising oil prices certainly affect shipping rates ( *freight* ) including shipping companies on the Indonesia Stock Exchange. The financial performance of the majority of shipping issuers was depressed by recording negative growth in net income, or even failing to make profits and having to surrender to losses. If the price of oil rises, the company's fuel costs will be higher and will erode the company's profits. For information, in the first quarter of 2019 the price of world Brent oil (for the European market benchmark) rose 32.44%, while the *lightsweet type* (WTI) rose 27.12%. (Ayuningtyas, 2019) In addition, based on data for loading and unloading goods from overseas shipping at Indonesian ports in 2014 it was 417,155 tons, in 2015 it decreased by 342,659 tons, and in 2016 it fell again by 313,175 tons. In 2017 it also decreased by 272,404 tons. On the fiscal side, in 2014 the ship fuel purchase tax policy has not been abolished so that the national ship operating costs are high, because fuel prices are always fluctuating which will have an impact on the shipping industry's business activities. A number of the world's shipping giants suffered heavy losses, their carrying capacity fell, causing massive layoffs.

The above phenomenon resulted in the global economic crisis. The shipping industry is not immune to the crisis. Even in 2017, competitors from overseas shipping industries emerged such as Hanjin and three Japanese maritime industry companies, Kawasaki Kisen Kaisha (K Line), Nippon Yusen Kabushiki Kaisha (NYK), and Mitsui OSK Lines (MOL) . Hanjin is a container shipping company from South Korea and the seventh largest container shipping company in the world , while Kawasaki Kisen Kaisha (K Line), Nippon Yusen Kabushiki Kaisha (NYK), and Mitsui OSK Lines (MOL) are the three Japanese maritime industry companies that have *joint ventures . operations*.

Another phenomenon is the decline in the mining and mineral sector in 2016 which resulted in 800 idle ships along the Mahakam River, East Kalimantan. The Indonesian shipping industry has continued to thrive in the last 10 years, since the issuance of Law no. 17 of 2008 concerning the cabotage principle, which resulted in the number of national vessels increasing from 6,041 units in 2015 to 24,046 units in 2016 consisting of shipping and special sea transportation fleets and the total transport capacity skyrocketing from 5.67 million GT ( *gross tons* ) in 2015 to 38.5 million GT in 2016.

In addition to the problems above, currently, the impact of the corona virus outbreak (covid-19) is also affecting the economies of countries around the world, including Indonesia (Ibrahim, 2020). Some institutions even predict the weakening of the world economy, one of which is *The International Monetary Fund* (IMF) projects that the global economy will grow at minus 3% (Ministry of Finance of the Republic of Indonesia, 2020).

The rupiah exchange rate against the United States (US) dollar has the potential to weaken up to Rp. 20,000 per US dollar due to the covid-19 outbreak. For a moderate estimate, it is in the range of Rp . 17,500 per US dollar. This is part of one of the 2020 macro assumption scenarios which all undergo changes, such as economic growth which is estimated at 2.3 percent to minus 0.4 percent. In addition, inflation of 5.1 percent and the price of Indonesian crude oil plummeted to USD 31 per barrel. The reason for the weakening of the rupiah was because investors panicked, resulting in what was called a capital reversal or *capital outflow* . During the period of this pandemic between January and March 2020 there has been a *capital outflow* in Indonesia's investment portfolio reached IDR 167.9 trillion. This *capital outflow* occurred worldwide, including in Indonesia, which was also the cause of the weakening of the rupiah exchange rate, driven by global panic resulting in the rapid spread of the COVID-19 outbreak in various worlds. (Diamond, 2020).

The above facts make shipping companies issuers have to prepare effective and efficient strategies both in the short and long term so that they can survive in the national market (www.jpnn.com). The increasingly



fierce business competition among issuers of service companies is forcing business activities to choose the right strategy. The intended business strategy is where the company can position itself and adapt to the changing economic environment. An effective business strategy to implement is *supply chain management* (SCM). SCM is an integrated management method, tool or approach, SCM is not only oriented to the company's internal affairs but also external affairs concerning the relationship of partner companies so that coordination and collaboration between partner companies is needed (Suchayowati, 2011). The point is to satisfy the end customer, the success of SCM depends on the strength of all the elements in it to create competitive ability. Shipping companies must coordinate and collaborate with loading and unloading companies (expeditioners) that provide cargo for shipping company ships, both in terms of cargo rates, provision of safe warehouses for cargo goods before goods enter the ship, placement of goods upon arrival on ships, on time delivery of goods, right volume and right recipient after the ship arrives at its destination and creates better trust and creates efficiency, so that the cost of cargo claims due to damage can be maintained, claim costs due to delays in goods arriving at their destination can also be maintained.

Currently, the rupiah exchange rate has decreased quite sharply. Shipping industry companies were most affected by the weakening of the rupiah against the United States (US) dollar. The weakening of the rupiah will burden many companies in Indonesia because the majority are still using imported goods. Shipping companies are more dominant in conducting international business activities using foreign currencies. As a result, there is uncertainty about how much revenue and payment for the company's obligations will occur in the future. Exchange rate is the risk caused by fluctuations in the exchange rate of one currency against another. The exchange rate of the Rupiah against other currencies, especially the USD, is more often weakened or devalued. This is what causes the company to try not to suffer too many losses due to the weakening of the Rupiah. The exchange rate is an important economic indicator, which has a strategic role in an economy. Exchange rate movements have a broad influence on various aspects of the economy, including price developments, export-import performance which in turn affects economic output. Therefore, in this study using foreign exchange rates for macro factors. The continuous increase in foreign exchange rates resulted in the shipping industry was hit, because many ship *spare parts had to be imported from Japan, Germany and China*. High inflation rates are usually associated with *overheated economic conditions*. This means that economic conditions experience a demand for products that exceeds the supply capacity of their products, so that prices tend to increase. Inflation that is too high will also cause a decrease in the *purchasing power of money*.

*Supply chain management* is one of the factors that affect financial performance measured through *cash generation* and *asset efficiency*. Previous research on the effect of *supply chain management* on *firm's performance* is the research of Vencataya *et al.*, (2016) which states that *supply chain management* has a positive and significant impact on operational performance. Similarly, research by Novitasari (2016), Wulandari *et al.*, (2016), Liu *et al.*, (2017), Duran and Akçi (2015), and Sabry (2015) also stated that *supply chain management* has a positive and significant effect on company performance. Meanwhile, other researchers found that *supply chain management* has no significant effect on company performance. (Shobayo, 2017; Rachbini, 2017)

The effect of *supply chain management* on *competitive advantage* is also found to be contradictory. There are researchers who find that *supply chain management* has a significant effect on *competitive advantage* (Vencataya *et al.*, 2016; Novitasari, 2016; Widyanesti and Masyithah, 2018; Sukati *et al.*, 2012; Handoko *et al.*, 2015; Kurniawan, 2016; and Yun and Kurniawan, 2017). Meanwhile, other researchers found that *supply chain management* has no significant effect on *competitive advantage*. (Ueki, 2013; Chen *et al.*, 2006; Swink *et al.*, 2007)

In addition to *supply chain management*, *competitive advantage* also affects the company's performance. *Competitive advantage* is measured through *asset utilization efficiency* and *price premium capability*. Effect of *competitive advantage* on company performance there are contradictions. Some researchers find that *competitive advantage* has a significant effect on company performance (Agha, 2012, Suharto and Devie, 2013; Novitasari, 2016; Widyanesti and Masyithah, 2018; Handoko *et al.*, 2015). Meanwhile, another study found that *competitive advantage* had no significant effect on company performance. (Tresna and Raharja, 2018)

Research gap review (*research gap*) The above shows that some previous researchers are still contradicting the influence of *supply chain management* on *competitive advantage* and *firm's performance*. Therefore, in this study, we will re-investigate the influence of these factors on company performance.

*supply chain* factors and *competitive advantage*, external actors that can affect the performance of shipping companies are macroeconomics. Macroeconomics (*macro-economics*) manifested in three things, namely *economic growth*, *inflation*, and the *exchange rate*. Previous studies present conclusions about the role played by the macroenvironment as a moderator. Wamalwa *et al.*, (2014) in Mbiti *et al.*, (2017) studying effective marketing strategies and superior performance find environmental demands as a key moderating factor, suggesting that organizations must be able to understand diverse, interrelated and often dialectical aspects of the environment. and match it with an effective strategy. Similarly, a significant moderating effect by the macro environment has been found by Kegode (2005) in Mbiti *et al.*, (2017) which states that without taking into account the impact of macroenvironmental forces, it is impossible to formulate a good strategy or conduct a profitable business.

The research of Mbiti *et al.*, (2017) with the main aim of examining the moderating effect between the relationship between performance and strategy can be seen in terms of dynamic ability theory as proposed by Wanyande (2001) in Mbiti *et al.*, (2017) which explains organizational capacity to intentionally creating, expanding or modifying its resource base according to the strategic choices the organization adopts to achieve its objectives. So overall, it can be concluded that the four components of the company's macro environment manifest and affect the strategy-performance relationship at various levels. This finding implies that companies depend on the environment and to manage the company's environment requires the right strategy choice. This study also presents a clear relationship between strategy - environment-performance, so managers of such companies should consider improving the survival and growth of the company.

Based on the above review, the *macro-economics* variable is positioned as a moderating variable that can strengthen or weaken the influence of *supply chain management strategy* and *competitive advantage* on *firm's performance* and *supply chain management* on *competitive advantage*. in companies engaged in the shipping industry and have been listed on the Indonesia Stock Exchange. *Supply chain management* strategies and *competitive advantage* are intangible assets that must be utilized by the company. However, company leaders need to consider the uncertainty of the *macro-economic environment* that has the possibility to affect the company's performance. This statement is in accordance with contingency theory which states that organizations are influenced by many contingencies including environment, size and technology. These contingencies are responsible for developing the specific structure and activities of an organization. When there is a mismatch between the contingent variables and the structure, the organization will achieve lower performance (Akintoye *et al.*, 2010) The tendency of economic development that is not strong enough and the condition of macro-economic factors that affect the maritime industry have had a significant impact, both abroad and domestically. This triggers to maintain a business strategy as to what must be done, not only to compete with competitors but also to survive in the current economic conditions.

Based on previous research that has been done, most of them argue that the *supply chain factor* is the main thing that plays a role in improving company performance, although there are still some researchers who have different opinions from the conclusions of the research results obtained. From the phenomena, *research gaps* and theories described above, the researchers were moved to examine whether the *supply chain management* process carried out by shipping companies listed on the BEI was able to affect *competitive advantage* and *firm's performance*, as well as examine the role of macroeconomics as a moderating variable.

## LITERATURE REVIEW

### *Supply Chain Management*

The term *supply chain management* was first coined by Oliver and Weber (1982), *Supply Chain* is a physical network in companies involved in supplying raw materials, producing goods, or sending them to end users. Simchi - Levi (2000 : 174 ) defines SCM as a set of approaches used for efficient integration of suppliers, manufacturers, warehouses and stores, so that goods are produced and distributed in the right quantities, at the right locations and at the right time to minimize the entire costing system with satisfactory service level requirements. While Hanfield and Nicholas (2002 : 53 ) define SCM as the integration of organizational management and *supply chain* activities through organizational cooperative relationships, effective business processes and information sharing to create a high-performance value system that provides a sustainable competitive advantage to the organization. In line with Chen *et al.*, (2004) that the most important thing in SCM is the sharing of information, therefore material flow, cash flow and information flow are all elements in SCM that need to be integrated.

The term *supply chain management* has different meanings for each organization. But one clear fact in the business world has been trying to achieve good efficiency in the process of *sourcing, making, delivering*. *Supply Chain Management* is an approach to streamline the integration process of *suppliers, manufacturers, warehouses* (warehouses), *storage* and other storage areas efficiently so that products are produced and distributed in the right quantity, at the right location and at the right time to minimize costs at the right time. The entire supply chain without leaving the optimal level of service satisfaction. (Simchi - Levi, 2000 : 1). Understanding *supply chain according to Schroeder* (2007:35) is an iterative business and information process that provides products or services from suppliers through the process of manufacture and distribution to consumers.

### **Competitive Advantage**

According to Porter (1985: 33), competitive advantage relates to the way in which companies choose and can actually implement generic strategies into practice. To be able to find its competitive advantage, every organization needs to identify activities with a value chain approach (*Supply Chain Management*).

Competitive advantage provides an edge over competitors and the ability to generate more value for the company and its shareholders. The more competitive the competitive advantage, the more difficult it is for competitors to neutralize its advantage. The two main types of competitive advantage are comparative advantage and differential advantage. Comparative advantage is generated by the company's ability to produce goods or services at a lower price than its competitors. This gives the company the ability to sell goods or services at a lower price than its competitors or generate a larger sales margin. A rational consumer will choose the cheaper of the two perfect substitutes offered. If the effect of comparative advantage is partially offset by imperfect substitution, higher margins for the lowest-cost producer will ultimately benefit shareholders through higher returns or provide more resources for research, development and infrastructure development, research and development to support future growth.

Comparative advantage can come from economies of scale, more efficient internal systems, location in geography with low or low labor costs. This does not necessarily imply the company can produce a better product or service, but that they can offer the product or service at a lower price. In the context of international trade economy, comparative advantage is determined by opportunity cost, and any part has a comparative advantage in something. Amazon.com Inc. is an example of a company focused on building and maintaining a comparative advantage. *Its e-commerce platform*, vendor relationships and delivery network provide a level of scale and efficiency that retail competitors find difficult to replicate. Amazon has stood out primarily through its price competition.

### **Macro -economics**

Macroeconomics (from the Greek prefix macro - meaning "big" and the word "economy") is the branch of economics that deals with the performance, structure, behavior, and decision-making of the economy as a whole, including national, regional and global economies (Sullivan, 2003). 2003 :117 ). The terms macroeconomics and microeconomics were coined by Ragnar Frisch.

### **Firm's Performance**

To evaluate the company's performance and plan the company's future goals, measuring the company's *performance* is one of the most important things for management. Various information regarding the company's activities, both financial information and non-financial information are collected so that the work activities that have been carried out can be evaluated, accounted for and for the future can be more easily controlled to achieve efficiency and effectiveness in all company business processes. Financial information is obtained from the preparation of the budget to control costs. Meanwhile, non-financial information is a key factor in determining the chosen strategy to carry out the goals that have been set.

According to Rudianto (2012: 89), performance is a description of the achievement of the implementation of an activity or program in realizing the vision, mission, goals, and organizational goals. Financial performance is the result or achievement that has been achieved by the company's management in carrying out its function of managing company assets effectively during a certain period. Financial performance is needed by companies to know and evaluate financial performance the level of success of the company based on the financial activities that have been carried out. To be able to evaluate the work of the company's



management in the financial sector, various financial information generated from the accounting process carried out by the company is used.

Therefore, the company's financial performance is reflected in the company's financial statements, such as the company's income statement. However, based on the purpose of the company being founded, which is not limited to providing large profits over time ( *maximizing profit*), but rather providing welfare for the owner ( *maximizing shareholder's profit*), it is very weak to decide whether or not the company's performance is just by looking at the profit or loss from the report. company finances. Financial statements provide an overview of the financial condition of a company, called the "balance sheet", which discloses the value of assets, liabilities and capital at a certain point in time, and the "income statement" which reports the results achieved during a certain period, usually covering the period. one year.

## RESEARCH METHODS

This study is an *explanatory research* because it aims to explain the relationship between variables through hypothesis testing, and is also a conclusive research (Malhorta and Peterson , 2001). In this study, the hypothesis is proven regarding the effect of *Supply Chain Management* , *Competitive Advantage* and *Firm's Performance variables* moderated by *Macro -economics Variables* on shipping industry companies in Indonesia. Economy as moderating variable, endogenous variable *Competitive Advantage* as intervening variable, and endogenous variable *Firm's Performance*.

### Population, Sample, Sample Size and Sampling Technique

Population is a generalization area consisting of objects or subjects that have certain qualities and characteristics determined by the researcher to be studied and then draw a conclusion (Lawrence, 1997 : 274 ). The population in this study are shipping industry companies listed on the Indonesia Stock Exchange from 2013 to 2019 totaling 23 companies . Given that the population is heterogeneous in terms of financial statements published from 2013 to 2019, the researchers set a population criterion, namely companies that publish complete financial statements, after being selected with these criteria, the population that meets the criteria is 15 companies, as stated in the following table:

**Table 1. Selection Process Population Based on Criteria**

Description	Total
Company (IDX Listed from 2013 to 2019)	23
Companies that do not have complete financial statements from 2013 to 2019	(8)
Companies that meet the criteria	15

Source: Processed by researcher

So the population in this study were 15 shipping industry companies.

### Research Sample

The sample is part of the number of characteristics possessed by the population, so the sample is part of the population (Lawrence, 1997 : 275 ). Given that the population in this study is relatively small and the researcher is able to access all the observed data, the entire population will be studied or will be sampled. Thus, the sampling technique used is saturated sampling (census). As stated by Sugiyono (201 8:85 ), if all members of the population are used as samples, then the sampling technique used is saturated sampling or what is often called census sampling. The number of observation periods is 7 years (2013-2019), so that from the 15 companies there were 105 financial statements that were observed .

### Research variable

The exogenous variables in this study are *Supply Chain Management* ( *SCM* ) and *Macro - economics* ( *ME* ). The exogenous *Macro-economics* variable ( *ME* ) is a moderating variable, because the researcher wants to know whether the *Macro-economic variable* can influence (strengthen and weaken) the relationship between the independent variable and the dependent variable.

The endogenous variable or dependent variable in this study is *Competitive Advantage* ( CA ) which is also a mediating variable . Another endogenous variable is *Firm's Performance* ( FP ).

Determination of score values for all the indicators mentioned above by using the Ratio Scale. The measurement is based on secondary data from the company's quarterly financial statements as shown in Table 2.

**Table 2. Research Instrument Design**

Variable	Indicator	Data Type	Variable Measurement
<i>Supply Chain Management</i> (SCM)	<i>Cash generation</i> (SCM <sub>1</sub> )	Secondary	Ratio Scale
	<i>Asset efficiency</i> (SCM <sub>2</sub> )	Secondary	Ratio Scale
<i>Macro-economics</i> (ME)	<i>Economic Growth</i> (ME <sub>1</sub> )	Secondary	Ratio Scale
	<i>Inflation</i> (ME <sub>2</sub> )	Secondary	Ratio Scale
	<i>Exchange Rate</i> (ME <sub>3</sub> )	Secondary	Ratio Scale
<i>Competitive Advantage</i> (CA)	<i>Asset Utilization Efficiency</i> (CA <sub>1</sub> )	Secondary	Ratio Scale
	<i>Price Premium Capability</i> (CA <sub>2</sub> )	Secondary	Ratio Scale
<i>Firm's Performance</i> (FP)	<i>Economic Value Added</i> (FP <sub>1</sub> )	Secondary	Ratio Scale
	<i>Market Value Added</i> (FP <sub>2</sub> )	Secondary	Ratio Scale

Source: Processed by researcher

### Data analysis technique

Data analysis was carried out using the component-based SEM method using PLS which was chosen as an analytical tool in this study. The *Partial Least Square* (PLS) technique was chosen because this tool is widely used for complex causal - predictive analysis and is an appropriate technique for use in prediction applications and theory development as in this study. PLS is a more appropriate approach for prediction purposes, especially in conditions where indicators are formative. With the latent variable in the form of a linear combination of the indicators, the prediction of the value of the latent variable can be easily obtained, so that the prediction of the value of the latent variable that it affects can also be easily obtained, so that the prediction of the latent variable that is affected can also be easily made.

With a small sample size will give the results of parameters and statistical models that are not good (Ghozali, 2008 :13 ). PLS doesn't require a lot of assumptions. According to Ghozali (2008 : 17 ), the data does not have to be *normally distributed multivariate* and the number of samples does not have to be large (recommended between 30-100). Because the number of samples used in this study was small ( < 200), PLS was used as an analytical tool. To perform tests with component-based SEM or PLS, it is used with the help of SmartPLS.

### 1. Structural Equation Model

#### a) Designing the Measurement Model ( *outer model* )

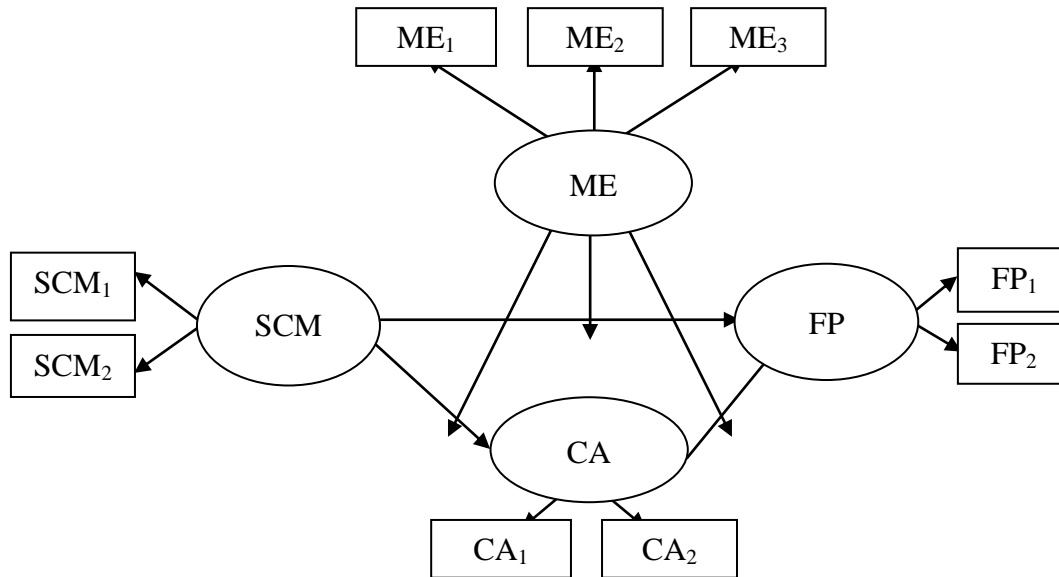
The measurement model is a model that relates the latent variable to the *manifest variable* . For the *Supply Chain Management* (SCM) variable consisting of 2 indicators SCM<sub>1</sub> and SCM<sub>2</sub> , the *Macro Economics* (ME) variable consists of 3 indicators ME<sub>1</sub> , ME<sub>2</sub> , and ME<sub>3</sub> , the *Competitive Advantage* (CA) variable consists of 2 CA indicators CA<sub>1</sub> and CA<sub>2</sub> , as well as the *Firm's Performance* (FP) variable consisting of 2 indicators FP<sub>1</sub> and FP<sub>2</sub> .

#### b) Designing a Structural Model ( *inner model* )

The structural model of the research is to build a model that connects exogenous variables ( *Supply Chain Management* and *Macro Economics* ) and endogenous variables ( *Competitive Advantage* and *Firm's Performance* ).

#### c) Analysis model

Flowcharts can help in illustrating a series of causal relationships between constructs. The relationship between constructs is described by connecting the constructs with arrows which indicate a direct causal relationship from one construct to another.



Picture. 1 Analysis Model

The mathematical model of the structural model as shown in Figure 4.1 above is as follows:

1) *Competitive Advantage (CA)*

Mathematical model

$$CA = 1.1 SCM + 1.2 ME + 1.3 SCM * ME + e_2$$

Information:

1.  $i$  = Regression weight exogenous ( $i = 1, 2, 3$ )

$e_1, e_2$  = Measurement error

2) *Firm's Performance (FP)*

Mathematical model

$$FP = 2.1 SCM + 2.2 CA + 2.3 ME + 2.4 SCM * ME + 2.5 CA * ME + e_4$$

Information:

2.  $i$  = Regression weight exogenous ( $i = 1, 2, 3, 4, 5$ )

$e_3, e_4$  = Measurement error

mathematical model of the measurement model is as follows:

1) *Supply Chain Management (SCM)*

$$SCM_1 = 1.1 SCM + e_1$$

$$SCM_2 = 2.2 SCM + e_2$$

2) *Competitive Advantage (CA)*

$$CA_1 = 1.1 CA + e_3$$

$$CA_2 = 2.2 CA + e_4$$

3) *Macro Economics (ME)*

$$ME_1 = 1.1 ME + e_5$$

$$ME_2 = 2.2 ME + e_6$$

$$ME_3 = 3.3 ME + e_7$$

4) *Firm's Performance (FP)*

$$FP_1 = 1.1 FP + e_8$$

$$FP_2 = 2.2 FP + e_9$$

Information :

(  $\lambda$  ) = Relationship between latent variables on indicators

$e$  ( error ) = Measurement error of the exogenous variable indicator

## 2. Evaluation of the Measurement Model ( Outer Model )

*Outer Model* is a measurement model to assess validity, measurement model parameters (convergent validity, discriminant validity, *composite reliability* and *Cronbach's alpha* ) as parameters for the accuracy of the prediction model (Abdillah and Hartono, 2015 : 193).

### a. Validity test

1. *Convergent validity* of the measurement model with the indicator reflective model is assessed based on *the loading factor* (correlation between *item score or component score* with *construct score*) which is calculated by SmartPLS. The value of *convergent validity* measures the magnitude of the correlation between the constructs and the latent variables, which can be seen from the expected *loading factor value*  $> 0.7$  so that it can be said to be ideal. Although  $> 0.5$  is still acceptable, while the *loading factor value*  $< 0.5$  can be excluded from the model.
2. *Discriminant validity* of the measurement model with reflexive indicators is assessed based on *cross loading* measurements with constructs. It is said to meet discriminant validity if the correlation of the construct with the measurement *item* is greater than the size of the other constructs. In addition, another way to see a model that has sufficient *discriminant validity* is if the root of the *average variance extracted* (AVE) for each construct is greater than the correlation between constructs and other constructs in the model. Therefore, to assess *discriminant validity* is to compare the value of the *square root of Average Variance. Extracted* ( AVE ) each construct with correlations between other variables in the model.

### b. Reliability Test

In a reliability study on SmartPLS, there are two different treatments for two types of indicators, namely the method for formative indicators and the method for reflective indicators. Reliability test to measure reflective indicators in PLS can be using two methods, namely *Cronbach's alpha* and *composite reliability* . *Cronbach' alpha* measures the lower limit of the reliability value of a construct while *composite reliability* measures the real value of the reliability of a construct. A construct is said to be reliable if the *Cronbach's alpha value* must be more than 0.6 and the *composite reliability value* must be more than 0.7 (Abdillah and Hartono, 2015).

## 3. Evaluation of the Structural Model ( Inner Model )

The structural model ( *inner model* ) is an evaluation of the *Goodness of Fit Index* or to test the hypothesis of a study. The structural model in SmartPLS is first evaluated using  $R^2$  for the dependent construct, the *path coefficient value* or the *t-value of each path* for the significant test between constructs in the structural model. The following is the method of testing the structural model:

- a. The value of  $R^2$  is used to measure the level of variation of changes in the independent variable to the dependent variable. The higher the  $R^2$  value, the better the prediction model of the proposed research model. The limiting value of  $R^2$  is divided into three classifications (Yamin and Kurniawan, 2011 :21 ). More details about the limits for the value of  $R^2$  are in table 4.3.

**Table 3 . Limitation of R Value <sup>2</sup>**

R-Square Nilai Value	Information
0.67	Substantial
0.33	Moderate
0.19	Weak

Source: Yamin and Kurniawan (2011 :21 )

- b. In structural model research, to measure how well the observed values are generated by the model and also the parameter estimates can use  $Q^2$  *predictive relevance* or coefficient of total determination in path analysis (similar to  $R^2$  on regression) (Noor, 2014 : 149 ) with the following formula:

$$Q^2 = 1 - (1 - R_1^2) (1 - R_2^2) \dots (1 - R_p^2)$$

Noor (2014:149), states that if the value of  $Q^2 > 0$ , then the model has *predictive relevance* , on the contrary if the value of  $Q^2 < 0$ , then the model is considered to have less *predictive relevance*.

#### 4. Hypothesis Testing

Hypothesis is a statement about the population that needs to be tested for truth. According to Suharyadi and Purwanto (2009) hypothesis testing is a procedure based on sample evidence used to determine whether the hypothesis is a reasonable statement and therefore not not accepted, or the hypothesis is not reasonable and therefore must be not accepted. Test the hypothesis in this study using the smart pls 3.0 software by looking at the *p-value*. The criteria used to test the proposed hypothesis is the value of *t - statistics* or *p - value*, if the *t - statistics value* > 1.96 (normal Z - score value) or *p - value* 0.05, then the research hypothesis is accepted. However, if the *t - statistics value* is < 1.96 or *p-value* > 0.05, the research hypothesis is not accepted.

**Table 4. Hypothesis test**

No	Hypothesis	Criteria		Decision
		<i>t - statistics</i>	<i>p-value</i>	
1	Supply Chain Management has a significant effect on Competitive Advantage	<i>t - statistics</i> > 1.96	<i>p- value</i> 0.05	Hypothesis accepted
		<i>t - statistics</i> < 1.96	<i>p-value</i> > 0.05	Hypothesis not accepted
2	Supply Chain Management has a significant effect on Firm's Performance.	<i>t - statistics</i> > 1.96	<i>p- value</i> 0.05	Hypothesis accepted
		<i>t - statistics</i> < 1.96	<i>p-value</i> > 0.05	Hypothesis not accepted
3	Competitive Advantage has a significant effect on Firm's Performance.	<i>t - statistics</i> > 1.96	<i>p- value</i> 0.05	Hypothesis accepted
		<i>t - statistics</i> < 1.96	<i>p-value</i> > 0.05	Hypothesis not accepted
4	Macro-economics moderate the influence of Supply Chain Management on Competitive Advantage.	<i>t - statistics</i> > 1.96	<i>p- value</i> 0.05	Hypothesis accepted
		<i>t - statistics</i> < 1.96	<i>p-value</i> > 0.05	Hypothesis not accepted
5	Macro-economics moderates the effect of Competitive Advantage on Firm's Performance	<i>t - statistics</i> > 1.96	<i>p- value</i> 0.05	Hypothesis accepted
		<i>t - statistics</i> < 1.96	<i>p-value</i> > 0.05	Hypothesis not accepted
6	Macro-economics moderates the influence of Supply Chain Management on Firm's Performance.	<i>t - statistics</i> > 1.96	<i>p- value</i> 0.05	Hypothesis accepted
		<i>t - statistics</i> < 1.96	<i>p-value</i> > 0.05	Hypothesis not accepted

Source: Conceptual framework and hypothesis development (2022)

Moderation variables can be classified into 5 (five) types, namely *absolute moderation*, *pure moderation*, *quasi moderation*, *homologiser moderation* (potential moderation), and *predictor moderation* (moderation as an explanation/predictor). An explanation of each type of moderating variable can be described as follows: (Solimun *et al.*, 2017:83)

For example,  $X_1$  is the explanatory/predictor variable,  $Y$  is the response/dependent variable, and  $X_2$  is the moderating variable, then the regression equation that can be formed is as follows: (Solimun *et al.*, 2017:84)

a. Without involving moderation

$$Y = b_0 + b_1 X_1$$

b. Involving moderating variables

$$Y = b_0 + b_2 X_1 + b_3 X_2$$

c. Involving moderating and interaction variables

$$Y = b_0 + b_4 X_1 + b_5 X_2 + b_6 X_1 * X_2$$

The types of moderating variables can be identified through the significance of the coefficients  $b_4$ ,  $b_5$ , and  $b_6$  in equation (c).

**Table 5 . Classification of Moderating Variables**

No	Moderate Variable Type	Coefficient
1	<i>Aboslute moderation</i> (absolute moderation)	$b_4$ and $b_5$ not significant $b_6$ significant
2	<i>Pure moderation</i>	$b_5$ not significant $b_6$ significant
3	<i>Quasi moderation</i> (pseudo moderation)	$b_5$ significant



No	Moderate Variable Type	Coefficient
		$b_6$ significant
4	Homologiser moderation (potential moderation)	$b_5$ not significant $b_6$ not significant
5	Predictor moderation (moderation as a predictor)	$b_5$ significant $b_6$ not significant

Source: Solimun *et al.*, (2017:86)

The explanation of the types of moderating variables is described as follows: (Solimun *et al.*, 2017:84-86)

a) Absolute moderation ( *absolute moderation* )

A variable is said to be absolute moderating if  $b_4$  and  $b_5$  are not significant and  $b_6$  is significant. The explanatory variable of SCM itself has no effect on the response variable of FP, as well as the moderating variable of ME alone has no effect on the response variable of FP. If the explanatory variable SCM interacts with the moderating variable ME (SCM\*ME), it will only affect the response variable of FP. So the existence of the ME variable (moderation) is absolutely necessary so that SCM has an effect on FP (response/dependent).

b) Pure moderation ( *pure moderation* )

A variable is said to be pure moderating if  $b_5$  is not significant and  $b_6$  is significant, in this case  $b_4$  can be insignificant or significant. The ME moderating variable alone has no effect on the FP response variable, namely  $b_5$  is not significant. If the explanatory variable SCM interacts with the moderating variable ME (SCM\*ME) it will affect the FP response variable. So the existence of ME (moderation) variable is purely as a moderating variable and does not act as an explanatory/predictor variable.

c) Pseudo moderation ( *quasi moderation* )

A variable is said to be pseudo moderating if  $b_5$  and  $b_6$  are significant, in this case  $b_4$  can be insignificant or significant. The ME moderating variable either alone or interacting with the explanatory variable SCM (SCM\*ME) has a significant effect on the FP response variable. So the existence of ME (moderation) variable doubles as a moderating variable and also an explanatory/predictor variable.

d) Potential moderation ( *homologiser moderation* )

A variable is said to be a potential moderator if  $b_5$  and  $b_6$  are not significant, in this case  $b_4$  can be insignificant or significant. The ME moderating variable, either alone or interacting with the explanatory variable SCM (SCM\*ME), has no significant effect on the FP response variable. So the existence of the ME (moderation) variable does not function as a moderating variable and also does not act as an explanatory/predictor variable. This variable only has the potential, rationally, theoretically or research results as moderating.

e) Explanatory variable / predictor ( *predictor moderation* )

A variable is said to be originally hypothesized as a moderating variable, but the test results show that the variable is an explanatory/predictor variable. This happens if  $b_5$  is significant and  $b_6$  is not significant, in this case  $b_4$  can be insignificant or significant. The ME moderating variable changed its position as an explanatory/predictor variable.

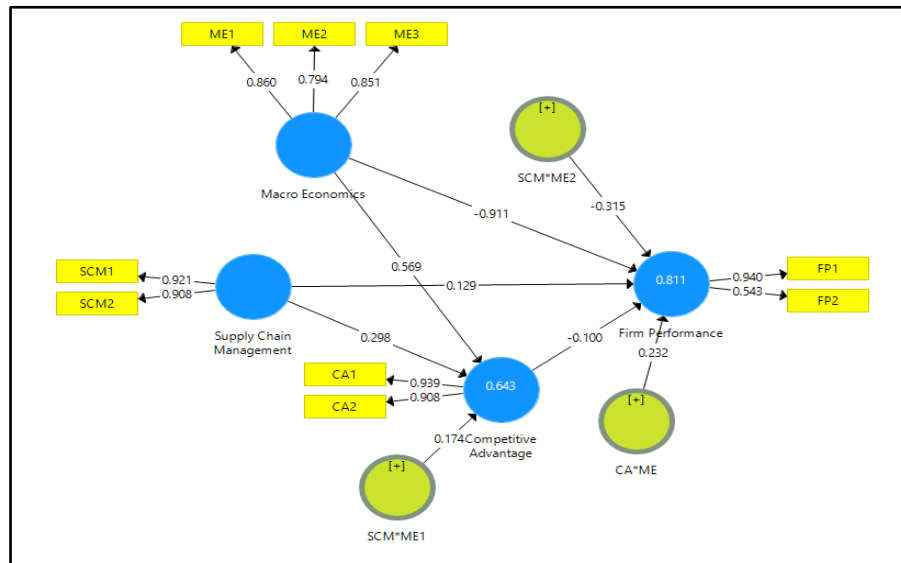
## RESEARCH RESULT

### Partial Least Square (PLS) Analysis

In the PLS analysis there are two kinds of evaluation models, namely evaluation of the measurement model ( *outer model* ) and evaluation of the structural model ( *inner model* ).

### Evaluation of the Measurement Model ( *Outer Model* )

The measurement model is used to assess validity and reliability. The validity assessment in the measurement model consists of *convergent validity* and *discriminant validity* , while the reliability test is viewed from the *composite reliability value* . Evaluation result *the outer model* is shown in the picture following:



Source: processed data

As the picture above, will explained related testing validity and reliability as following:

**1. Validity test**

The value of *convergent validity* measures the correlation between the indicators and their constructs, which can be seen from the value of the *outer loading*, if the value of the *outer loading* is more than 0.5 , it can be said that the measurement model has good *convergent validity* . Here are the *outer loading* values of each construct.

**Table 6. Outer Loading Value**

Variable	Indicator	Outer Loading Value
Supply Chain Management (SCM)	SCM <sub>1</sub>	0.921
	SCM <sub>2</sub>	0.908
Competitive Advantage (CA)	CA <sub>1</sub>	0.939
	CA <sub>2</sub>	0.908
Macroeconomics (ME)	ME <sub>1</sub>	0.860
	ME <sub>2</sub>	0.794
	ME <sub>3</sub>	0.851
Firm's Performance (FP)	FP <sub>1</sub>	0.940
	FP <sub>2</sub>	0.543

Source: I appendix 3

Description:SCM<sub>1</sub> ( Cash generation ); SCM<sub>2</sub> ( Asset efficiency ) ; CA<sub>1</sub> ( Asset Utilization Efficiency ) ; CA<sub>2</sub> ( Price Premium Capability ) ; ME<sub>1</sub> ( Economic Growth ) ; ME<sub>2</sub> ( Inflation ) ; ME<sub>3</sub> ( Exchange Rate ) ; FP<sub>1</sub> ( Economic Value Added ) ; FP<sub>2</sub> ( Market Value Added ) .

The table above presents the *outer loading value* of each indicator with its construct. The overall value of the *outer loading* on the indicators that measure the constructs of *supply chain management*, *competitive advantage*, *macro-economic*, and *firms' performance* is more than 0.5 , so it can be said that the model has met good *convergent validity* .

Next is the assessment of discriminant *validity* which can be viewed from the *cross loading value*. The model is said to meet discriminant validity if the correlation of the construct with the measurement indicator is greater than the size of the other constructs. The following is the *cross loading value* of each indicator to the construct it measures.

**Table 7. . Cross Loading Value**

	SCM	CA	ME	FP
SCM <sub>1</sub>	<b>0.921</b>	0.622	0.613	-0.469
SCM <sub>2</sub>	<b>0.908</b>	0.587	0.677	-0.426
CA <sub>1</sub>	0.590	<b>0.939</b>	0.744	-0.751



	SCM	CA	ME	FP
CA <sub>2</sub>	0.639	<b>0.908</b>	0.643	-0.537
ME <sub>1</sub>	0.616	0.619	<b>0.860</b>	-0.614
ME <sub>2</sub>	0.766	0.552	<b>0.794</b>	-0.507
ME <sub>3</sub>	0.459	0.696	<b>0.851</b>	-0.940
FP <sub>1</sub>	-0.459	-0.696	-0.851	<b>0.940</b>
FP <sub>2</sub>	-0.272	-0.308	-0.366	<b>0.543</b>

Source: I appendix 3

Description: CA ( *Competitive Advantage* ) ; ME ( *Macro-economy s c* ) ; SCM ( *Supply Chain Management* ) ; FP ( *Firm's Performance* ) ; SCM<sub>1</sub> ( *Cash generation* ) ; SCM<sub>2</sub> ( *Asset efficiency* ) ; CA<sub>1</sub> ( *Asset Utilization Efficiency* ) ; CA<sub>2</sub> ( *Price Premium Capability* ) ; ME<sub>1</sub> ( *Economic Growth* ) ; ME<sub>2</sub> ( *Inflation* ) ; ME<sub>3</sub> ( *Exchange Rate* ) ; FP<sub>1</sub> ( *Economic Value Added* ) ; FP<sub>2</sub> ( *Market Value Added* ) .

The table above presents the *cross loading value* of each indicator with its construct. The value of the *cross loading* of each indicator in the construct that was measured is much greater in value when compared to other constructs, so it can be said that the measurement model has met good *discriminant validity*.

## 2. Reliability Test

The reliability test is used to measure the reflective indicators by reviewing the *composite reliability value* . If the *composite reliability value* is more than 0.7 , it can be said that the construct is reliable. The following is the *composite reliability value* of each construct.

**Table 8 . Composite Reliability Value**

Variable	Composite Reliability
<i>Supply Chain Management (SCM)</i>	0.911
<i>Competitive Advantage (CA)</i>	0.921
<i>Macroeconomics (ME)</i>	0.874
<i>Firm's Performance (FP)</i>	0.728

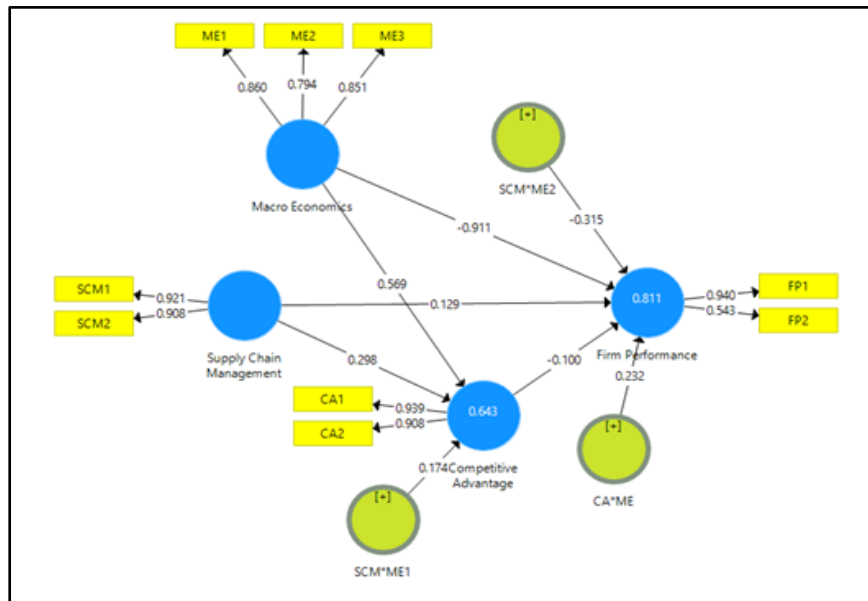
Source: I appendix 3

The table above shows that the *composite reliability value* of each construct of *supply chain management*, *competitive advantage*, *macro-economic*, and *firms' performance* is more than 0.7 , so it can be said that the construct is reliable.

Based on testing the validity and reliability of the above, can be said that the measurement model has Fulfill validity convergent ( *convergent validity* ) , validity discriminant *validity* , and reliability, so *that* could next for To do evaluation *inner models*.

## Evaluation of the Structural Model ( *Inner Model* )

The structural model between exogenous variables ( *Supply Chain Management* ) and *Macro-economisc* ) and endogenous variables ( *Competitive Advantage* and *Firm's Performance* ) is as follows:



The structural model ( *inner model* ) consists of: from evaluation R- Square (  $R^2$  ) and Q - Square (  $Q^2$  ).

**1. Value of R - Square (  $R^2$  )**

The value of R - Square is the coefficient of determination on the endogenous construct. R - Square values are 0.67 (substantial), 0.33 (moderate) and 0.19 ( weak). Here is the R2 value of the endogenous construct :

**Table 9. R -Square . Value**

Construct	R value <sup>2</sup>	Information
Competitive Advantage	0.643	Substantial
Firm's Performance	0.811	Substantial

Source: I appendix 3

The R - Square value for the path of influence of *supply chain management* and *macro-economics* on *competitive advantage* is 0.643 , meaning that *supply chain management* and *macro-economics* are able to explain and influence *competitive advantage* by 64.3 percent, while the remaining 35.7 percent explained by other variables not examined. So, in this structural model it is known that the R - Square on the endogenous construct is in the substantial category, which means that strong *supply chain management* and *macro-economics* influence *competitive advantage* .

Then the value of R - Square for the path of influence of *supply chain management*, *macro-economics*, and *competitive advantage* on *firm's performance* is 0.811 , meaning that *supply chain management*, *macro-economics*, and *competitive advantage* are able to explain and influence *firm's performance* of 81.1 percent, while the remaining 18.9 percent is explained by other variables not examined. So, in this structural model, it is known that the R - Square on the endogenous construct is in the substantial category which means that *supply chain management*, *macro-economics*, and strong *competitive advantage* influence *firm's performance* .

**2. Value of Q -Square (  $Q^2$  )**

The Q- Square value is used to measure how well the observation value is generated by the model and also the parameter estimates can use  $Q^2$  predictive relevance or the coefficient of total determination. The calculation is as follows:

$$Q^2 = 1 - (1 - R_1^2)(1 - R_2^2)$$

$$Q^2 = 1 - (1 - 0,643)(1 - 0,811)$$

$$Q^2 = 1 - (0,357)(0,189) = 0,933$$



From the above calculation, the value of  $Q$  - Square ( $Q^2$ ) is  $0.933 > 0$  (zero), so the model has accurate *predictive relevance to the construct of competitive advantage and firm's performance*.

Reviewing the value of  $R$  - Square and  $Q$  - Square, it can be concluded that the structural model formed is *robust*, so that hypothesis testing can be carried out.

### Research Hypothesis Testing Results

Testing this hypothesis is part of measuring *the inner model*. Test this use one-way, so if the  $t$  - statistics value  $> 1.96$  (normal  $Z$ -score value) or  $p$ -value  $0.05$ , then the influence between researched variables is significant. The results are as shown in the following table:

**Table 10 Path Coefficient s**

Track	Coefficient	t - statistics	p -value
SCM -> CA	0.298	2,100	0.036
SCM -> FP	0.129	1,461	0.145
CA -> FP	-0.100	1.067	0.286
SCM * ME -> CA	0.174	2,179	0.030
CA*ME -> FP	0.232	2,771	0.006
SCM*ME -> FP	-0.315	3.086	0.002
ME -> CA	0.569	4,246	0.000
ME -> FP	-0.911	9.180	0.000

Source: 1 appendix 3

Description: CA ( *Competitive Advantage* ) ; ME ( *Macro-economic* ) ; SCM ( *Supply Chain Management* ) ; FP ( *Firm's Performance* )

Based on the table above, each research hypothesis can be described as follows:

- Hypothesis 1  
*supply chain management (SCM)* path coefficient is positive and significant to *competitive advantage (CA)*, because the  $t$  - statistic value is 2,100 more than 1.96 and  $p$ -value of  $0.036 < 0.05$ , so the hypothesis that *supply chain management* has a significant effect on *competitive advantage* can be accepted.
- Hypothesis 2  
*supply chain management (SCM)* path coefficient is positive and not significant to the *firm's performance (FP)*, because the  $t$  - statistic value of 1.461 is less than 1.96 and the  $p$ -value is  $0.145 > 0.05$ , so the hypothesis stating *supply chain management* significant effect on *firm's performance* is not accepted.
- Hypothesis 3  
*competitive advantage (CA)* path coefficient is negative and not significant to the *firm's performance (FP)*, because the  $t$  - statistic value is 1.067 less than 1.96 and  $p$ -value of  $0.286 > 0.05$ , so the hypothesis that *competitive advantage* has a significant effect on *firm's performance* is not accepted.
- Hypothesis 4  
*supply chain management* path coefficient on *competitive advantage with macro-economics* moderation is positive and significant, because the  $t$  - statistic value is 2.179 more than 1.96 and a  $p$ -value of  $0.030 < 0.05$ , so that moderating *macro-economics* affects and strengthens the relationship between *supply chain management* and *competitive advantage*, so the hypothesis that *macro-economics* moderates the effect of *supply chain management* on *competitive advantage* is acceptable. . Type *macro-economics* moderation on the influence of *supply chain management* on *competitive advantage* is *quasi moderation*, because the path of influence of *macro-economic* variables on *competitive advantage* variables is significant and the path of influence of *supply chain management* and *macro-economics* interaction variables on *competitive* variables significant *advantage*.
- Hypothesis 5  
*competitive advantage* path coefficient on *firm's performance with macro-economics* moderation is positive and significant, because the  $t$  - statistic value of 2.771 is more than 1.96 and the  $p$ -value is  $0.006 < 0.05$ , so that moderating *macro-economics* affects and strengthen the relationship between *competitive advantage* and *firm's performance*, so that the hypothesis which states that *macro-economics* moderates the effect of *competitive advantage* on *firm's performance* is acceptable. Type moderation *macro-economic* s there is an

effect of *competitive advantage* on the *firm's performance* is pseudo moderation ( *quasi moderation* ) , because track influence *macro-economic s* bel variable against varia bel *firm's performance* significant and path influence interaction bell variable *competitive advantage* and *macro-economic s* against variable *firm's performance* significant.

#### f) Hypothesis 6

Coefficient of *supply chain management path to firm's performance with macro-economics* moderation is negative and significant, because the *t - statistic value* is 3.086 more than 1.96 and a *p-value* of 0.002 <0.05 , so that this moderating *macro-economics* affects the and weaken the relationship between *supply chain management* and *firm's performance* , so that the hypothesis which states that *macro-economics* moderates the influence of *supply chain management* on *firm's performance* is *acceptable* . The type of *macro-economic moderation* on the influence of *supply chain management* on *firm's performance* is *quasi moderation* , because the path of the influence of the *macro-economic variable* on the *firm's performance variable* is significant and the path of the influence of the *supply chain management and macro-economic variables interaction on the firm 's performance variable* significant.

## CONCLUSION

In general, the conclusion from the results of this study is that *supply chain management* has a significant effect on the *competitive advantage* of companies engaged in the shipping industry listed on the Indonesia Stock Exchange from 2018 to 2019, so that the first hypothesis (H1 ) is proven true. *Supply chain management* and *competitive advantage* have no significant effect on the *firm's performance*, so that the second hypothesis (H2) and the third hypothesis (H3) are not proven true. *Macro -economics moderating* is proven to affect *supply chain management relationships with competitive advantage* , as well as the relationship between *competitive advantage* and *supply chain management with firm's performance*, so that the fourth hypothesis (H4), fifth hypothesis (H5), and sixth hypothesis (H6) have been proven true .

## Suggestion

Suggestions that can be given to further researchers is as a form of research development is to apply research in companies engaged in different fields. In addition, further researchers can also add other independent variables not examined in this study.

Then the advice that can be given to the management of companies engaged in the shipping industry, especially those that are the sample in this study, is that there should be more attention to *supply chain management* in an effort to increase *competitive advantage* , because from the results of this study *supply chain management* proved to have a significant effect . to *competitive advantage*. *Macro-economic factors s* is an external factor that affects the company 's operations, because from the results of this study the moderating of *macro-economics* affects connection *competitive supply chain management advantage and firm's performance* , as well as *competitive relationship advantage with firm's performance* .

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