

# Influence of Economic Indicators on Supply Chain: Evidence from Indonesian Fishing Industry

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**Abstract-** The supply chain dynamics has been broadly examined and experienced by the academes, industrialists as well as economists. However, still the literature is missing with the effect of economic indicators on supply chain practices, particularly in fishing industry. Therefore, the objective of the current study is to examine the role of economic indicators on supply chain in fishing industry of Indonesia. Fishing industry is one of the industries which is working from many centuries and now growing rapidly and considered to be the important element of economic growth in different countries like Indonesia. Six hypotheses were formulated with the help of previous studies, concerning the relationship between inflation rate, interest rate, human development index (HDI), gross domestic product (GDP) and supply chain. GDP was considered as the mediating variable. Managerial employees of fishing companies were selected as the respondents of this study. Primary data was collected by conducting the questionnaire survey. Total number of one hundred and ninety-six (196) response were received. These responses were analysed with the help of statistical software namely; Partial Least Square (PLS). It was found that economic indicators have influence on supply chain. Increases in inflation rate and interest rate decreases the supply chain. However, increases in HDI enhances the GDP and promote supply chain activities. Additionally, GDP is a mediating variable between HDI and supply chain which positively enhances the supply chain through HDI. Thus, study provides the clues for government to promote supply chain by controlling inflation and interest rate.

**Keywords-** Supply chain, inflation, interest rate, gross domestic product (GDP), human development index (HDI).

## 1. Introduction

Fishing industry has significant impact on the economy of various countries which heavily based on supply chain activities [15]. The fishing industry comprises any industry concerned with processing, storing, culturing, preserving, selling fish, transporting and

marketing fish products which requires well managed supply chain system. In all these processes, inflation rate, interest rate and human development index (FDI) are important. These three elements have major contribution in supply chain activities. As demonstrated by various studies that inflation rate and interest rate are both have important relationship with return [8].

The supply chain has been largely examined and experienced in academes, industrialists and economists [10,18]. However, still the literature is missing with the effect of economic indicators on supply chain practices, particularly in fishing industry. Economic indicators include; inflation rate, interest rate, human development index (FDI) and gross-domestic product (GDP). Fishing industry is an industry which is working from numerous centuries. Recently it is growing speedily and considered to be the vital element of economic growth in various countries.

Figure 1 shows the fish exports by various countries. It is clear that China is leading in Fish exports. Fishing industry of China has major importance of its economy. However, as the study has focused on Indonesian Fishing industry, the Indonesia is on number second in Fish exports. Indonesia exports are approximately 5,813,800 tons each year. Followed by the United States having 5,128,381-ton exports, India has 4,862,861-ton exports, Peru has 4,841,524-ton exports, Russian Federation has 4,331,398-ton exports, Japan has 3,644,328-ton exports, Myanmar has 3,579,250-ton exports, Vietnam has 2,622,200-ton exports and finally, Chile has 2,572,881-ton fish exports each year. Therefore, apart from China, the Indonesian fishing industry is on top. As the industry is growing, it also has threat from the inflation rate, interest rate, HDI and GDP. Therefore, the current study focused on these elements to examine the effect of economic indicators on supply chain of fishery industry in Indonesia.

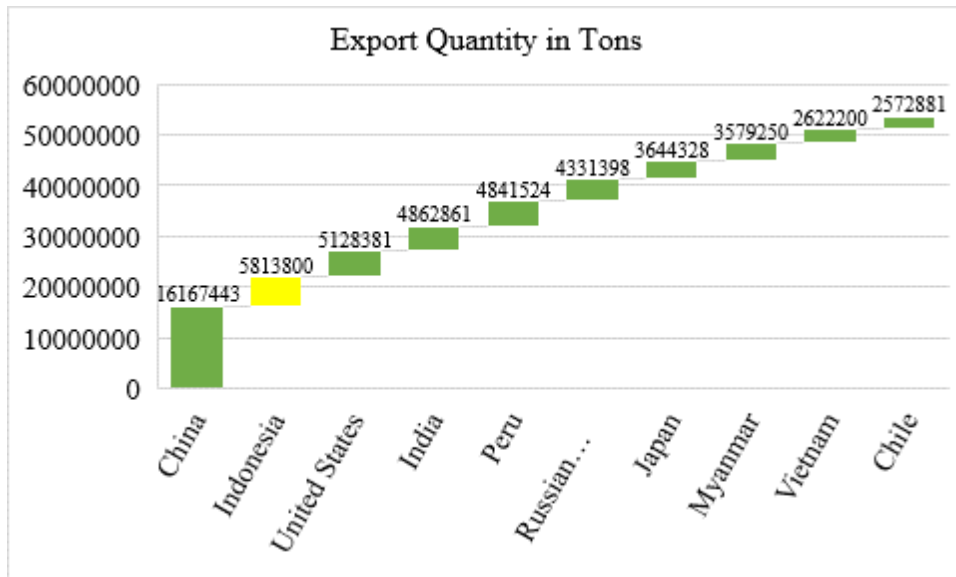


Figure 1. Comparison of Fish export by various countries with Indonesia

Different studies examined the relationship of supply chain practices and fishery industries but none of the study formally documented the role of economic indicators in supply chain practices [15,19,25]. Therefore, the objective of the current study is to examine the role of economic indicators in supply chain. The other objectives are given below. Figure 2

shows that how economic indicators effect on supply chain practices.

1. To examine the role of economic indicators, namely; inflation rate, interest rate and HDI on supply chain.
2. To examine the meditating role of GDP between HDI and supply chain.

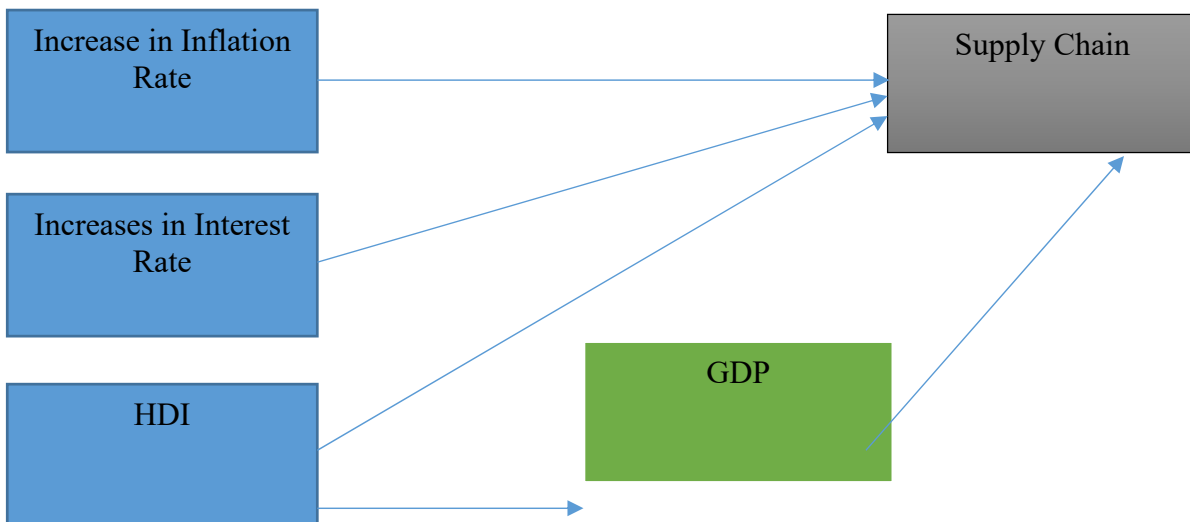


Figure 2. Theoretical framework of the study showing that how economic indicators effect on supply chain

## 2. Literature Review

### 2.1 Increase in Inflation and Supply Chain

Inflation is one essential variable in macroeconomics. Inflation is characterized as the expansion in the general price of goods after some time. At whatever point the general price of goods increases, the purchasing power of consumer decreases, which effect negatively on supply chain activities of goods. Normally, monetary strategies assume to control the inflation situations in a nation. The central bank

utilizes those fiscal strategies to control the economic performance with the end goal to maintain and avoid inflation [20].

Inflation effect the buying and selling of goods and services between buyer and seller which has significant relationship with supply chain of goods and services. Increases in inflation, decreases the supply chain activities. The buyer tends to pay the price as late as could reasonably be expected, or, in other words not restricted by the seller. The inflation of the money devalues the services and products which result in disadvantages for the seller on late instalment. The

buyer tends to pay back late to build his aggregate cash esteem. Hence, the inflation likewise assumes a critical job to the two parties' sellers and buyers of the short-lived items. This situation drives an ideal methodology to determine the requesting approach for ordering policy for a supply chain system [28]. As the supply chain industry is generally based on transfer of goods and services [7,30], therefore it has significant effect by the inflation rate. Increases in inflation also increases the prices of goods which influence negatively on supply chain activities.

The stock level changes with time because loss of materials due to inflation. Give  $I(t)$  a chance to be the stock level at time  $t$ . Depletion of stock happens because of the demand and decay of materials. The deterioration could happen when the materials are physically existing in the stock at time  $t$  ( $I(t)$ ), and no damage of materials while lack period since it doesn't exist while the rest of the remaining period [ $1, 1$ ]. The supply chain model under inflation model is shown in Figure 2. Thus, below hypothesis is proposed.

$$\frac{dI(t)}{dt} + \theta I(t) = -D, \quad 0 \leq t \leq T.$$

**H1:** Increase in inflation rate has significant negative effect on supply chain.

## 2.2 Increases in Interest and Supply Chain

The interest rate is a yearly price charged by the lenders to the borrowers. Generally financial foundations or lenders force an interest on the borrower's dependent on the whole loans that was taken. Hristov, Hülsewig, and Wollmershäuser (2014) considered the development of retail bank interest in Europe from 2003 to 2011 [17]. The study inspected structural changes and interest rate in Europe. The examination found that there is a huge connection between basic changes and interest rate spread in Europe. It is said that financial issues have made the neighbourhood banks in Europe fix the insurance necessities. At the point when a bank settles on a choice to fix the base necessity, banks in Europe would confront money related unpredictability. These changes in interest rate has significant influence on supply chain activities of various products as well as services. Hristov et al. (2014) found that the interest rate should be stable in order to avoid unwanted economic results [17]. Because it increases the price and decreasing the purchasing power which has negative effect on supply chain activities. Were and Wambua (2014) intended the various elements of interest rate spread in Kenya's banking industry from the year 2002 to 2011 [31]. These financial organizations are turn into the principle specialists controlling the monetary development for 44.4 million individuals. The outcome demonstrates that the variable (bank particular) give more critical outcomes contrasted with different factors (macroeconomics) with the end goal to decide the interest rate spreads in Kenya. Better control by financial institutions on interest rate has impact on supply chain of goods and services. However, the political influent may disturb the financial matters [22].

The client pays no interest while find period they are assumed to settle the amount; but in case of instalment is deferred and not paid in specified time, interest will be charged. The client can begin to aggregate incomes on the deal or utilization of the item, and gain interest on that income. So, it is to the benefit of the client to allow the instalment to the provider until the end of the period [28]. The increases in interest rate decreases the ability of customer to purchase the goods and decreases the supply chain activities [2,9,20]. Therefore, increases in interest rate has negative influence on supply chain activities.

**H2:** Increase in interest rate has significant negative effect on supply chain.

## 2.3 Human Development Index (HDI), Gross-Domestic Product (GDP) and Supply Chain

The Human Development Index (HDI) is one of the statistic composite index of life expectation, per capita income and education comprise of various indicators which are utilized to rank different countries into four layers of human development. A country scores a higher HDI when the education level is higher than others, the lifespan is higher and the GDP per capita is higher. HDI is one of the important development indicator [23,24] which has significant relationship with GDP as well as supply chain activities among different firms.

Kandemir (2012) considered a couple of elements like education, income of people and wellbeing with the end goal to discover which human advancement elements assumes an essential worldwide [21]. The information for this investigation was gathered from the World Bank and the HDI information from the United Nations Development Program. The results show that people generally attract more to those countries having good HDI. Therefore, better HDI of country attract people to work in a better way which enhances the GDP having significant effect on supply chain activities.

As the supply chain is based on the transfer of goods and services [5,32] which requires certain level of skills and education, thus, HDI is most crucial in supply chain activities. Better education and skills enhances the productivity which influence positively on GDP as well as supply chain. As both the supply chain and GDP has significant association with each other's [1]. Thus, it is evident that HDI has significant role to enhance GDP and GDP has significant role in supply chain activities. Therefore, below hypotheses are proposed.

**H3:** Increases in HDI has significant positive effect on supply chain.

**H4:** Increases in HDI has significant positive effect on GDP.

**H5:** Increases in GDP has significant positive effect on supply chain.

**H6:** GDP mediates the relationship between HDI and supply chain.

### 3. Research Methodology

Self-visit to the fishing companies was preferred to collect the data in order to find the impact of economic indicators on supply chain in fishing industry of Indonesia. According to Polit Denise and Hungler Bernadette, information obtained during the investigation or study is called data. In this research, questionnaire is used for the purpose to collect information which is associated to objectives as well as research questions of the study. Therefore, in order to obtain information, questionnaire was distributed among the managerial employees of fishing companies [26].

In this study cluster sampling technique was selected to analyse the data. Cluster sampling was selected to overcome the issue of sampling frame. Because the current study does not have sampling frame. Cluster sampling is suitable when the study does not have sampling frame and population spread on a wide area

[14,29]. Moreover, this study utilized 5-point Likert scale. Likert scale is suitable to decreases the frustration of respondents and increases the reliability of data which shows significant effect on the outcomes of the study.

Prior to start the analysis of study, the missing value was examined. It was found that increases in interest rate has 05 missing values, increases in inflation has 03 missing values, supply chain has 02 missing values, GDP has 01 missing value and HDI has 04 missing values. All these missing values were settled with the help of SPSS. Moreover, outlier in the data may also influence the results of the study. Therefore, the treatment of outlier was also performed with the help of SPSS version 21. Moreover, multicollinearity between the independent variables was also examined. According to the literature, VIF value should not exceed 5.0. More than 5.0 value indicates the problem which may affect on the hypotheses results. Results of multicollinearity is shown in Table 1.

**Table 1.** Multicollinearity

| Variables                         | VIF   |
|-----------------------------------|-------|
| Gross Domestic Product (GDP)      | 3.008 |
| Human Development Index (HDI)     | 4.726 |
| Increases in interest rate (IINR) | 3.231 |
| Increases in inflation (IIR)      | 2.150 |

### 4. Data Analysis

#### 4.1 Confirmatory Factor Analysis

This study adopted structural equation modeling to test the developed hypotheses. In this study, the instructions of previous studies are followed [16,27]. It is evident from the literature that PLS-SEM requires various steps

such as outer model assessment and inner model assessment [11-13]. In first step, factor loading is required more than 0.5 for all items, composite reliability and AVE required to be more than 0.7 and 0.5 respectively. Figure 3 shows factor loading and Table 2 and Table 3 shows all the results.

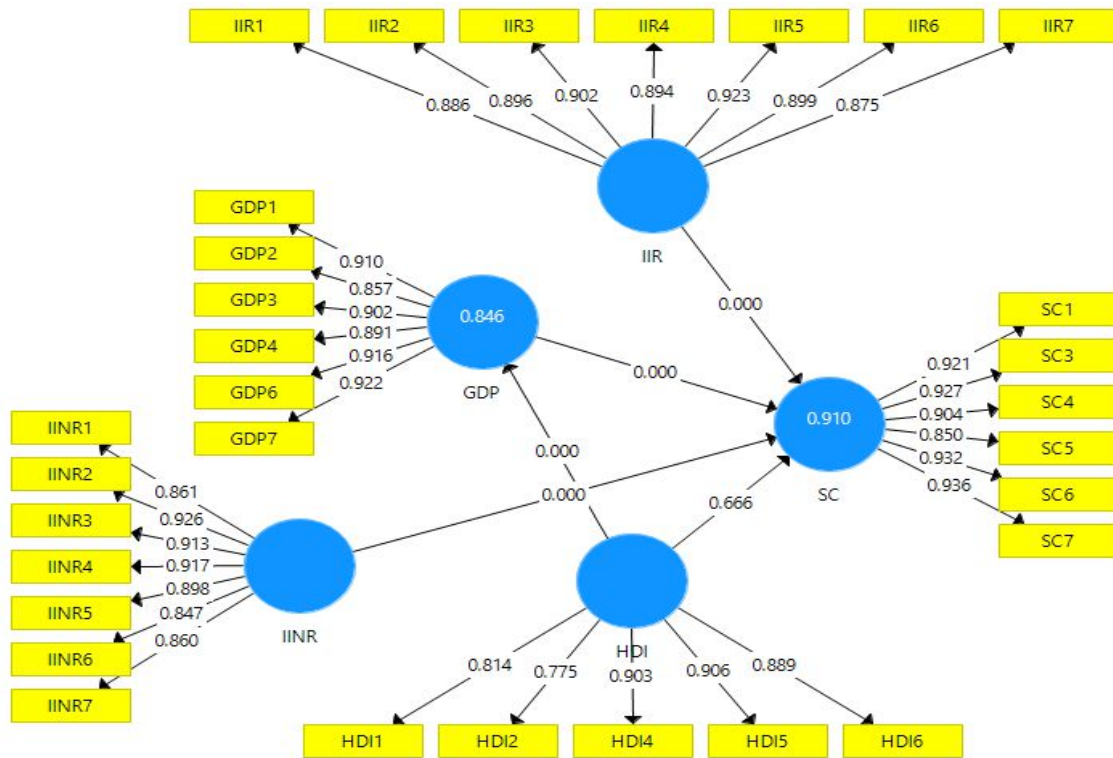


Figure 4. Assessment of Measurement Model

Table 2. Factor Loadings

|       | GDP   | HDI   | IINR  | IIR   | SC    |
|-------|-------|-------|-------|-------|-------|
| GDP1  | 0.910 |       |       |       |       |
| GDP2  | 0.857 |       |       |       |       |
| GDP3  | 0.902 |       |       |       |       |
| GDP4  | 0.891 |       |       |       |       |
| GDP6  | 0.916 |       |       |       |       |
| GDP7  | 0.922 |       |       |       |       |
| HDI1  |       | 0.814 |       |       |       |
| HDI2  |       | 0.775 |       |       |       |
| HDI4  |       | 0.903 |       |       |       |
| HDI5  |       | 0.906 |       |       |       |
| HDI6  |       | 0.889 |       |       |       |
| IINR1 |       |       | 0.861 |       |       |
| IINR2 |       |       | 0.926 |       |       |
| IINR3 |       |       | 0.913 |       |       |
| IINR4 |       |       | 0.917 |       |       |
| IINR5 |       |       | 0.898 |       |       |
| IINR6 |       |       | 0.847 |       |       |
| IINR7 |       |       | 0.860 |       |       |
| IIR1  |       |       |       | 0.886 |       |
| IIR2  |       |       |       | 0.896 |       |
| IIR3  |       |       |       | 0.902 |       |
| IIR4  |       |       |       | 0.894 |       |
| IIR5  |       |       |       | 0.923 |       |
| IIR6  |       |       |       | 0.899 |       |
| IIR7  |       |       |       | 0.875 |       |
| SC1   |       |       |       |       | 0.921 |
| SC3   |       |       |       |       | 0.927 |
| SC4   |       |       |       |       | 0.904 |
| SC5   |       |       |       |       | 0.85  |
| SC6   |       |       |       |       | 0.932 |
| SC7   |       |       |       |       | 0.936 |

Table 3. Measurement Model Results

|      | Cronbach's Alpha | rho A | Composite Reliability | Average Variance Extracted (AVE) |
|------|------------------|-------|-----------------------|----------------------------------|
| GDP  | 0.953            | 0.954 | 0.962                 | 0.810                            |
| HDI  | 0.911            | 0.923 | 0.933                 | 0.738                            |
| IINR | 0.956            | 0.957 | 0.964                 | 0.791                            |
| IIR  | 0.959            | 0.96  | 0.966                 | 0.804                            |
| SC   | 0.959            | 0.961 | 0.967                 | 0.832                            |

Discriminant validity was examined with the help of Heterotrait-Monotrait ratio. It is shown in the Table 4. It is evident that the all the values are below 0.85

which is one of the evidence of discriminant validity achievement.

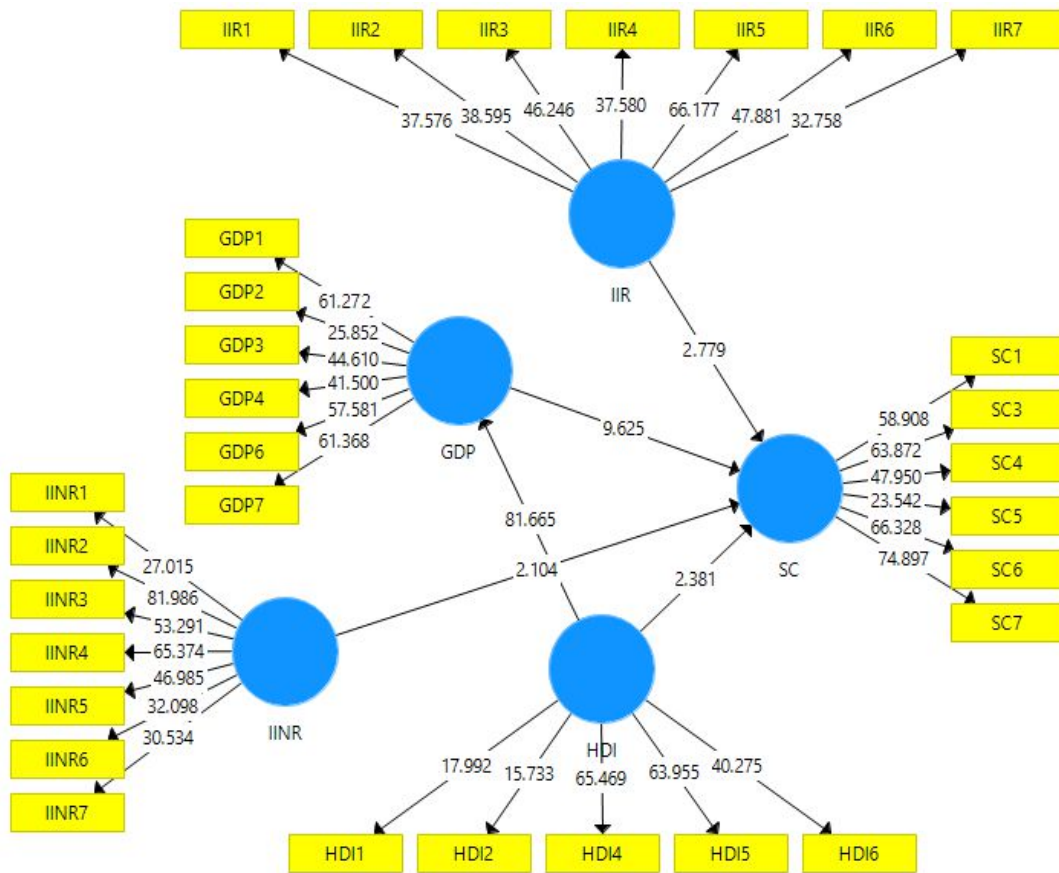
**Table 4.** Discriminant Validity

|      | GDP   | HDI   | IINR  | IIR   | SC |
|------|-------|-------|-------|-------|----|
| GDP  |       |       |       |       |    |
| HDI  | 0.845 |       |       |       |    |
| IINR | 0.744 | 0.786 |       |       |    |
| IIR  | 0.729 | 0.796 | 0.675 |       |    |
| SC   | 0.690 | 0.961 | 0.762 | 0.730 |    |

**4.2 Hypotheses Testing**

Below Figure 4 shows PLS bootstrapping. The Table 5 shows the results of PLS bootstrapping. According to these results, all the direct hypotheses (H1, H2, H3,

H4, H5) are supported. As it is evident from the Figure 4 that the t-value is above 1.96 for all the hypotheses. Moreover, it is also shown in Table 5. T-value above 1.96 and p-value below 0.05 is the indication of acceptance of hypotheses.



**Figure 3.** Assessment of Structural Model

**Table 5.** Hypotheses Results

|            | Original Sample (O) | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics ( O/STDEV ) | P Values | Decision  |
|------------|---------------------|-----------------|----------------------------|--------------------------|----------|-----------|
| GDP -> SC  | 0.724               | 0.722           | 0.075                      | 9.625                    | 0.000    | Supported |
| HDI -> GDP | 0.92                | 0.920           | 0.011                      | 81.665                   | 0.000    | Supported |
| HDI -> SC  | 0.218               | 0.212           | 0.091                      | 2.381                    | 0.018    | Supported |
| IINR -> SC | -0.183              | 0.185           | 0.087                      | 2.104                    | 0.036    | Supported |
| IIR -> SC  | -0.153              | 0.147           | 0.055                      | 2.779                    | 0.006    | Supported |

Effect of mediation was also examined with the help of PLS bootstrapping technique. It this step, it was found that the mediation effect of GDP is significant. As the

p-value is below 0.05 which is the indication of significant relationship, as shown in Table 6.

**Table 6.** Mediation effect of GDP

|                  | Original Sample (O) | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics ((O/STDEV)) | P Values |
|------------------|---------------------|-----------------|----------------------------|--------------------------|----------|
| HDI -> GDP -> SC | 0.666               | 0.664           | 0.071                      | 9.434                    | 0.000    |

Additionally, the effect size of each variable is also given. According to the results, GDP and HDI has strong effect on supply chain. Moreover, increases in inflation rate has moderate effect on supply chain.

However, increases in interest rate has small effect. All the results are shown in Table 7. Finally, the  $R^2$  for the current study is 0.910 which is substantial [4]. Moreover, effect size was examined based on the recommendations of Cohen (1988) [6].

**Table 7.** Effect Size ( $f^2$ )

| Variables                   | Value | Effect Size ( $f^2$ ) |
|-----------------------------|-------|-----------------------|
| Increases in Inflation rate | 0.151 | Moderate              |
| Increases in Interest Rate  | 0.025 | Small                 |
| HDI                         | 0.851 | Strong                |
| GDP                         | 0.690 | Strong                |

## 5. Findings

This study investigated about the supply chain activities of fishing industry of Indonesia. Mainly, the role of economic indicators was investigated on supply chain. Three main economic indicators were selected, namely; inflation rate, interest rate and human development index (HDI). Moreover, the mediating role of GDP between HDI and supply chain was examined. Managerial employees of fishing companies were selected to gather the information about the effect of economic indicators on supply chain in fishing industry.

Total number of six hypotheses were formulated with the help of literature. In total six hypotheses, five was established to examine the relationship of inflation and supply chain, interest and supply chain, HDI and supply chain, HDI and GDP, GDP and supply chain. One mediation hypothesis was established to examine the mediation effect on GDP between HDI and supply chain.

The relationship between increases in inflation rate and supply chain found t-value 2.779 and beta value -0.153. These results show significant relationship; however, beta value shows negative sign. Negative beta value indicates indirect relationship between supply chain and increases in inflation rate. Increases in inflation rate decreases the supply chain among fishing companies. In line with this, the relationship of increase in interest rate and supply chain also found similar results. In this relationship t-value is 2.104 and beta value -0.183. Similar with previous results beta value shows negative sign. Increases in interest rate decreases the supply chain.

Moreover, the relationship between HDI and supply chain found significant with t-value 2.381 and beta value 0.218. In this case beta value is positive showing that the relationship between HDI and supply chain is positive. Increases in HDI increases the supply chain.

In line with these outcomes, relationship between HDI and GDP also found significant positive with beta value 0.92. Increases in HDI increases the GDP. Moreover, increases in GDP increases the supply chain as the t-value found 9.625 and beta value 0.724. Final hypothesis of the study found that GDP is a mediating variable between HDI and supply chain. Mediation effect found t-value 9.434 and beta value 0.666. Thus, GDP enhances the positive effect of HDI on supply chain.

## 6. Conclusion

While analysing the data, it was found that economic indicators have influence on supply chain. Increases or decreases in the performance has significant influence on supply chain, particularly in fishing companies of Indonesia. According to the findings, increases in inflation rate decreases the supply chain. However, decreases in inflation rate increases the supply chain. Moreover, it is found that increases in interest rate decreases the supply chain. In both cases, increases of inflation and increases of interest rate decreases the supply chain. However, in cases of human development index (HDI), generally the supply chain increases. Increases in the per capita income and education among people increases the supply chain. Same results were found in cases of GDP, increases in HDI increases the GDP. Therefore, HDI is important for both GDP and supply chain. Finally, the GDP also has positive effect on supply chain.

It is recommended to the Indonesian government to decreases the inflation rate, decreases the interest rate and increases the human development index (HDI). Inflation and interest must be at minimum level to enhance supply chain performance. Additionally, future research is required to analyse that how much each economic indicator contributes to the supply chain or economy of the country.

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