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# THE EFFECT OF FISHERIES SECTORS ON ECONOMIC GROWTH IN ACEH-INDONESIA

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## ABSTRACT

This study aims to find out the effect of fisheries sector on economic growth in Aceh -Indonesia. In this study the economic growth variable is represented by Growth Domestic Regional Product (GRDP) while the fisheries sector used includes all total fisheries production and special allocation funds for the fisheries sector. The model used in this study is panel data regression analysis using Random Effect Model (REM) method. The results show that economic growth is only affected by fisheries production positively, while special allocation funds for the fisheries sector are not significant. The recommendation of this study is that fisheries production should be managed directly by local government to gives economic value for the product and review the allocation of special allocation funds for the fisheries sector.

**Key words**: Fisheries Sector, Economic Growth

## INTRODUCTION

Fisheries is one of agricultural sub-sector that have a major contribution to the Aceh economy, if the **resources are *optimally* utilized.** In general, fisheries have two types, namely land and sea. For Aceh, the potential of marine fisheries is very dominant, supported the most part Aceh was the coastal areas. The utilization of marine resources can be an economic circular flow so it can improve people's welfare of Aceh in a sustainable manner. In addition, the output produced from fisheries sector is large enough to meet the nutritional and protein needs of Aceh's people. Singh's (2007) study proved that fish production is a source of income that plays an important role in overcoming inequality in household income in India.

Regarding the economic development of fisheries sector, the government has committed to increasing the capacity of fisheries resources by prioritizing fisheries and marine sectors as a basis for food security and supporting economic progress in the future. In this case, fisheries

  

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production in Aceh Province in 2016 reached 267,883 tons produced from capture fisheries of 184,191 tons and aquaculture fisheries of 82,692 tons.

**Table 1**
**Fisheries Production in Aceh Province, 2012 – 2016 (Tons)**

| Fisheries Production | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Total Production | 185.584 | 202.181 | 210.508 | 231.430 | 266.883 |
| 1. Capture Fisheries | 145.367 | 155.269 | 159.487 | 167.348 | 184.191 |
| - Marine capture fisheries | 144.015 | 153.692 | 157.944 | 165.779 | 182.464 |
| - Inland capture fisheries | 1.352 | 1.577 | 1.544 | 1.570 | 1.726 |
| 2. Aquaculture | 40.218 | 46.912 | 51.021 | 64.082 | 82.692 |

*Source : Aceh BPS (2018)*

Based on Table 1, fisheries production in Aceh Province in the period 2012-2016 continues to increase from year to year. Increasing production of fisheries is driven by an increase in capture fisheries and aquaculture production. Marine capture fisheries are the most produced with a total of 182,464 tons in 2016, followed by aquaculture of 82,692 tons and capture fisheries in inland of 1,720 tons at the same time. This increase in production is an indication of an increase in economic growth.

Sources of funding, both through the APBN, APBD, and various other sources are also needed by government to increase economic growth. These roles *include* the local government through the Regional Budget (APBD) develop facilities and infrastructure to improve the accessibility of services to people which is expected to improve Aceh economy. But in reality, the facilities and infrastructure to support fisheries sector are still low due to the use of allocations often unuseful for development and not enjoyed by all citizens, these funds should be more emphasized for more productive activities.

In response to this problem, expansion still requires fiscal support in other forms. One form of fiscal support expected by regional governments to encourage investment in capital is financing through Special Allocation Fund (DAK) of fisheries sector schemes in intergovernmental transfer mechanism. Special allocation funds are funds originating from the state budget and given to districts / cities to finance certain special needs (Suparmoko, 2006: 43). As one part of a special program that is a national priority and also become regional affair, namely the marine and fisheries sector, local governments can use special allocation funds of marine and fisheries to create economic growth because it is a source of funds to finance medium term physical development activities in the marine and fisheries sector in order to support basic services which

  

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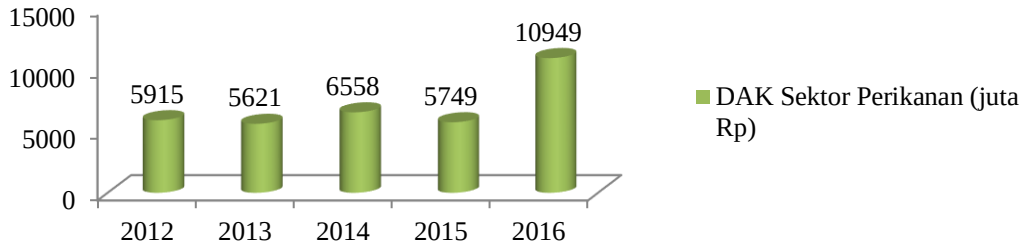
are provincial or district / city affairs in accordance with national priorities (Permen KP Number 61 of 2017).

DAK for marine and fisheries is directed to improve facilities and infrastructure for the production, processing, quality improvement and marketing and supervision and provision of facilities and infrastructure for empowerment in coastal areas and small islands. The potential for special allocation funds for the fisheries sector in Aceh Province from 2012 to 2016 fluctuated. The development of special allocation fund for fisheries sector during five years can be seen in Figure 1.




*Source: Ministry of Finance's Ministry of Finance (2018)*

**Figure 1. Specific Allocation of Fisheries Sector in Aceh Province, 2012-2016 (Million Rp)**

From the description above, it can be concluded that the fisheries sector is important to study, because the contribution of fisheries sector to GDP is still relatively low and the allocation of funds for fisheries sector tends to fluctuate, which in turn will affect economic growth in Aceh Province.

## THEORETICAL LITERATURE

### Fisheries Production on Economic Growth

Fisheries production is an economic activity in the field of fishing or collecting fish / other aquatic animals / water plants that live in the sea / public waters freely and not owned by individuals by means of taking natural resources directly without changing the form of goods (Sofiyanti & Suartini, 2016).

The maritime and fisheries sector can be used as a source of economic growth because of the carrying capacity of: (1) Large supply capacity, supported by increasing demand; (2) Output in the form of fish and fisheries processing industries can be exported, on the other hand the inputs come from domestic resources; (3) The upstream and downstream industrial potential is large so it can absorb a lot of labor; and (4) The products are renewable, thus supporting sustainable development (Pusdatin KKP, 2015: 25).

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**DAK of Fisheries Sector on Economic Growth**

As the definition of DAK in Law No. 33 of 2004, DAK is intended to help finance special activities in certain areas which are regional affairs and in accordance with national priorities, especially to finance the needs of basic community service facilities and infrastructure that have not reached certain standards or to encourage acceleration of regional development.

In this case, the DAK of marine and fisheries is intended to provide facilities and infrastructure to increase fisheries and community salt production, watershed conservation areas, infrastructure on small islands, facilities for surveillance infrastructure, and infrastructure facilities for small-scale businesses of marine and fisheries communities (fishermen and fish cultivator). For capture fisheries, supporting facilities consist of fishing vessels and fishing units, while supporting infrastructure consists of fishing ports, net factories, ice factories, accessibility, and human resources. For aquaculture, supporting facilities consist of maintenance area, feed, fertilizer and limestone, as well as pesticides and medicines, while supporting infrastructure consists of electricity, water pumps and windmills, plots of logging and enlargement, and human resources (Napitupulu, 2016).

**EMPIRICAL LITERATURE**

Empirical studies regarding the effect of fisheries sector on economic growth have been explored in various countries. Study of the fisheries sector was carried out by Raza et al. (2012) in Pakistan, and Chongela (2015) in Tazania found that the significant role of fisheries sector in agricultural sub-sectors to GDP.

Hassan & Gichinga (2018) conducted a study with a descriptive survey selected from 198 respondents in Mogadishu to determine the influence of fisheries management in the economic development of Mogadishu, Somalia. The results showed that there was a significant effect of adding fish value to economic development.

In Indonesia, Zulkarnain et al. (2013) examined the effect of aquaculture production value on GDP fisheries sector in Indonesia using linear regression analysis from 2000-2010. The results indicated that the production value from fresh water pond, marine culture and brackish water pond has a positive influence while the value of paddy field production has a negative effect on GDP of fisheries sector in Indonesia.

Another study, Teniwut (2016) investigated the performance of fisheries sector in Maluku Province in the short and long term from 2004-2013 using the Vector Auto Regression (VAR). The results showed that fisheries production has a positive effect on GRDP. In the short term

  

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capture sea fisheries are the main contributors to the fisheries sector, but in the long term, aquaculture appears as a major contributor to the fisheries sector.

Furthermore, Agustiani & Syechalad (2016) observed the contribution given by the fisheries sector to GRDP in 23 districts / cities in Aceh Province from 2010-2014 by applying Fixed effect panel data analysis model. The results showed that aquaculture production is positively and significantly affected to GDP. Meanwhile, the number of fish farmers, capture fisheries production and cultivation area is positively affected but not significant.

Dianissa (2018) in her research also used a panel data model to examine the effect of fisheries sub-sector factors on GDP of North Sumatra Province. The results showed that GDP is positively and significantly affected by the number of fishing vessels and the number of capture fisheries production, negatively and significantly by the number of fishing trips and negatively and not significantly by the number of fishermen and fishing units.

Syamsuri, Amril & Triana (2018) analyzed the strategy of increasing the economic growth of the marine sector through the influence of marine tourism, capture fisheries and sea transportation companies on economic growth (Gross Regional Domestic Product) in South Sulawesi Province from 2006-2015. The analysis model used is multiple linear regression. This finding confirms that capture fisheries have a positive and significant effect on economic growth.

Furthermore, research on Special Allocation Funds (DAK) on economic growth has been widely carried out but is still very rare which emphasizes the marine and fisheries sector. In a study conducted by Safrianto (2016) about the effect of fiscal decentralization on economic growth in Aceh using multiple linear regression models. It was found that special allocation funds have a significant positive effect and had the greatest influence on economic growth in Aceh.

Setiyawati & Hamzah (2007) in a study of the influence of PAD, DAU, DAK and regional development spending on economic growth, poverty, and unemployment stated that DAK have a positive but not significant effect on economic growth.

The study conducted by Susanto & Marhamah (2016) found that special allocation funds have a positive and significant effect on regional economic growth in East Java, whereas when regional expenditure is added as a moderating variable, special allocation funds do not significantly influence economic growth.

Likewise, the results of Laranga et al. (2017) using the multiple regression analysis method found that special allocation funds have a negative and not significant effect on GRDP in North Halmahera Regency. Muti'ah (2017) also stated that there was no effect of special allocation funds on Indonesia's economic growth.

  

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## MODEL AND DATA

The analytical method used in this study is panel data analysis to determine the effect of fisheries sector on economic growth in Aceh. The dependent variable used is economic growth while the independent variable in this study is fisheries production and special allocation funds for fisheries sector. The data used are panel data, with time series data over the period 2012-2016 and cross section data of 23 districts / cities in Aceh Province.

In econometrics, the effect of fisheries sector includes fisheries production and special allocation funds for fisheries sector to economic growth in Aceh. Mathematically, the model was represented as :

$$\mathbf{PDRB = f\ (TP, DAKP)} \quad \text{..... (3.2)}$$

Formulated to be,

$$\mathbf{LPDRB_{it} = \alpha_0 + \beta_1 LTP_{it} + \beta_2 LDAKP_{it} + \varepsilon_{it}} \quad \text{..... (3.3)}$$

Where :

| | |
|---|---|
| $\alpha_0$ | = Constants |
| $\beta_1$, $\beta_2$ | = Regression Coefficient |
| $PDRB_{it}$ | = Gross Regional Regional Domestic Product i in period t |
| $TP_{it}$ | = Total Regional Fisheries Production i in period t |
| $DAKP_{it}$ | = Specific Allocation Fund of Fisheries i in period t |
| i | = District / city (23 districts / cities) |
| t | = Time series (2012-2016) |
| L | = Logarithm |
| $\varepsilon$ | = Error term |

The model specification above follows from Agustiani & Syechalad (2016) and Dianissa (2018) who employ panel data regression. However, in this model, the author has linked the special allocation funds of for fisheries sector and economic growth. These variables are transformed into logarithm to interpret the model easily because of unit differences in variables.

Three techniques of approach in using panel data include pooled least square (common effect), fixed effect and random effect approach (Gujarati & Porter, 2012).

1. Pooled Least Squares, is the simplest panel data regression approach by pooling all time series data and cross section with OLS (Ordinary Least Square) method. This model ignores differences between time and individuals so the assumption in this model is the behavior of data between districts / cities alike in various time periods. This method is known as the estimation of common effect.

  

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2. Fixed Effect Model, is an approach that adds a dummy model to panel data so it is also called Least Square Dummy Variable (LSDV) Model. The assumption in this model is that the regression coefficient (slope) is fixed between districts / cities and between times, but the intercepts differ between districts / cities but are same time (time invariant).
3. Random Effect Model, is an approach where the parameters is different between districts / cities and times are included in the error so random effect model is also called error component model.

Before determining the model between common effect, fixed effect and random effect, it will be chosen based on several tests, namely Chow test, Hausman test and Lagrange Multiplier test.

1. Chow test is a test to determine the model of whether a fixed effect or common effect uses the F test statistic. The Chow Test has the following hypothesis:

$H_0$ = pooled least square (restricted) model

$H_1$ = fixed effect (unrestricted) model

The criteria is if $F_{statistic} > F_{table}$ then reject $H_0$, it means that intercept for all units of the cross section is not the same. In this case, the fixed effect model will be used to estimate the equation.

2. Hausman test is a test to choose the model of whether a fixed effect or random effect. The result of Hausman test is the difference in covariance from an efficient estimator and an inefficient estimator is zero, then following Wald's criteria, Hausman test uses a chi-squares distribution with a degree of freedom of k, where k is the number of independent variables.

The null hypothesis of Hausman test:

$H_0$ = random effect model

$H_1$ = fixed effect model

The criteria is if the $\text{Chi-square}_{statistic}$ value > $\text{Chisquare}_{table}$ or p-value $<\alpha$ then $H_0$ is rejected, so the model used is fixed effect model.

3. LM (Lagrange Multiplier) test is a test to determine the model of whether of common effect or random effect models.

The null hypothesis of LM test:

$H_0$ = common effect model

$H_1$ = random effect model

The criteria is if the p-value $<\alpha$ then $H_0$ is rejected, so the model used is a random effect model.

  

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## RESULTS AND DISCUSSION

### Model Testing

The testing of this model is intended to determine the best approach from the common effect model, fixed effect model and random effect model. The selection of the best model is taken based on F test (Chow Test) and Hausman test and the Lagrange Multiplier test. The results of panel data regression model with some approaches are reported in Table 2.

**Table 2**
**Specification Model Test**

| Testing | Criteria | |
|---|---|---|
| | **Statistics** | **Prob** |
| Chow test (CEM/FEM) | 627.5042 | 0.0000* |
| Hausman test (REM/FEM) | 2.9454 | 0.2293 |
| LM test (CEM/REM) | 210.9547 | 0.0000* |

*Notes: * significant at α = 5%*
*Source: Eviews 9 Data Processing Results (2018)*

The result of this test shows that Chow test compares the model between fixed effect or common effect, the probability value of 0.0000 is smaller than 5 percent. By following the hypothesis in Chow test, where common effect for the null hypothesis and fixed effect for the alternative hypothesis, it can be concluded that fixed effect is better than common effect.

Next is the determination of model between random effects or fixed effects, Hausman test is performed. It can be seen that Hausman test results obtained a probability value of 0.2293 greater than 5 percent so it cannot reject $H_0$, so random effect model is better used than a fixed effect to analyze economic growth in Aceh Province.

To approve these results, Lagrange Multiplier test is conducted, obtained a probability value of 0.0000 smaller than 5 percent, so random effect model is the appropriate model for this study.

### Analysis of Regression Results

Based on the results of testing the model indicated the random effect model as an estimation model to analyzes the effect of fisheries sector on economic growth in Aceh. Table 3 below is the result of panel data regression using a random effect model approach.

  

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**Table 3**
**Results of Estimated Economic Growth Models Using Random Effect Model (REM) Method**

| **Dependent Variable** | **Economic Growth (LPDRB)** | | | |
|---|---|---|---|---|
| **Independen Variable** | **Coefficient** | **Std. Error** | **t-statistic** | **Prob.** |
| C | 12.0146 | 0.1651 | 72.7721 | 0.0000 |
| Total Fisheries Production (LTP) | 0.1113 | 0.0219 | 5.0832 | 0.0000* |
| Special Allocation Fund of Fisheries Sector (LDAKP) | 0.0135 | 0.0146 | 0.9221 | 0.3584 |
| **$R^2$** | 0.1999 | **Fstat** | 13.9973 | |
| **Adj $R^2$** | 0.1857 | **Prob.F stat** | 0.0000 | |

*Notes: * significant at α = 5%*
*Source: Eviews 9 Data Processing Results (2018)*

The results of random effect model estimation in Table 3 show the $R^2$ of 0.1999, implies that 19.99 percent variation in economic growth measured using GRDP is explained by each explanatory variable of this study. In addition, economic growth is influenced by total fisheries production at 5 percent, while the variables that insignificant is special allocation funds for the fisheries sector.

**Effect of Fisheries Production on Economic Growth**

The fisheries production variable significantly influences economic growth at 5 percent level of significance and this agrees with the a priori expectation, which is a positive effect of 0.1113. An increase in fishery production by one percent will be followed by an increase in economic growth of 0.11 percent assuming ceteris paribus. Thus, the hypothesis is proven that fisheries production can increase economic growth in Aceh.

This relationship can be seen in the direct impact of fish production associated with sales, and the sale of fish will increase income while expanding employment opportunities for the producers, due to the demand for fish. In addition there are indirect impacts of "upstream" and "downstream" of production activities that occur through commodity supply chains. "Upstream" activities are activities that supply inputs to fishing operations. Inputs for small-scale capture fisheries include: investment costs in ships, machinery and equipment; operational costs of fuel, ice, food, bait; labor costs; financial services; and maintenance costs. Whereas "Downstream" activities are activities that follow the harvesting of product, which themselves require inputs. Some examples of inputs needed are: investment in design, construction and equipment, processing and marketing facilities; labor; transportation of fish from landing sites and to markets; financial services; variable costs such as ice, knives, wood for smoking, salt for drying, packaging materials and fish boxes; and maintenance costs. All of these fishing activities can be the main drivers of economic growth and poverty alleviation (FAO, 2005).

If the output from the fisheries sector is further processed through canning fish, it will provide added value to the product and affect economic growth. This is stated by Hassan & Gichinga

  

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(2018) that the addition of fish value through processing fish led to an increase in processed fish exports due to increased quality. Increased exports directly affect economic growth.

This result is in line with Teniwut's (2016) research that fisheries production has a positive effect on Maluku GRDP. However, he said, the fisheries sector will face several challenges in the long term, such as the expectation of high fish prices in the future, exploitation of fish resources and illegal fishing which will hamper production. Other studies such as Raza et al. (2012), Zulkarnain et al. (2013), Chongela (2015), Dianissa (2018) and Syamsuri, Amril & Triana (2018) also prove the positive and significant effect of fisheries production on economic growth.

**Effect of Specific Allocation Funds for Fisheries Sector on Economic Growth**

The analysis results show that the effect of the fisheries sector special allocation fund on economic growth in Aceh Province is positive and not significant at 5 percent. The expected sign of this variable is also positive of 0.0135. It means that if the fisheries sector special allocation fund increases by one percent, economic growth will increase by 0.01 percent.

While the insignificant effect of special allocation fund for fisheries sector because this fund has not been utilized optimally. Although special allocation funds for fisheries sector have been allocated to various regions for physical activities such as the construction / improvement of basic physical infrastructure and facilities to support increased fisheries production. But in fact after receiving DAK in fisheries sector, the performance of the marine and fisheries sector still faces various problems. It can be seen from many fishermen who complained about the malfunction of cold storage facilities, fish markets and fish processing markets that have been built in Lampulo Ocean Port Fisheries Industry Area (PPS), there is no ice block factory to preserve marine catches, unstable fuel supply for sea needs, and the technology applied by fish farmers are still traditional so production is also low. The use of special allocation funds are less effective causing the allocation of funds does not to have an impact on economic growth.

The results of this study are consistent with Laranga et al. (2017) and Muti'ah (2017) stated special allocation funds have no significant effect on economic growth, but are contrary to the research of Setiyawati & Hamzah (2007), Safrianto (2016) and Susanto & Marhamah (2016) explained that special allocation funds have a positive and significant effect on economic growth.

## CONCLUSION

Based on the discussion presented, this study highlighted the factors that influence economic growth in Aceh Province are:

1. Fisheries production has a positive and significant effect on economic growth. It means that an increase in production of fisheries sector will increase economic growth in Aceh Province.

  

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2. Specific allocation funds for the fisheries sector have a positive and insignificant effect on economic growth. It means that an increase in special allocation funds for fisheries sector will increase economic growth, but the allocation has not been utilized optimally due to constraints faced by the fisheries sector so it does not have impact on economic growth.

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