

Economic base determination and influence of several variables against contributions percentage of the GRDP in Aceh Besar district

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Abstract. The percentage contribution of Gross Regional Domestic Product (GRDP) in Aceh Besar district is influenced by several leading sectors, such as agriculture, building sector, trade, hotel and restaurant sector, transport and communications, financial sector, leasing and business services, and services sector. Based on the use of Location Quotient (LQ) method and multiple regression model, the effect of labor variables and population to Gross Regional Domestic Product by 2000 constant prices for agriculture and trade. For each addition of one workforce in the trading sector, the trade sector contribution will increase by 0.000014157%. Thus, the trade sector contribution will increase by 0.0000013786% in every addition of one soul of the population. Whereas, for every addition of one human resource in the agricultural sector will be reduced by 0.0002%. In other words, for each addition of one soul of the population will reduce the contribution of the agricultural sector by 0.00008611%.

1. Introduction

The success of economic development of a region can be seen from the economic growth achieved by the region. Economic growth is calculated from the value of the gross domestic product (GDP) or gross regional domestic product (GRDP). The increase in income per capita reflects an excellent economic development of a region and demonstrates the welfare of the people. However, it does not mean that income per capita should increase continuously, because the per capita income may decrease in any time, real growth, and society economy indicator [1]. The income per capita also related to technological improvement. For example, the agricultural sector, formerly land processing still using animal power but now changed into a tractor machine. Generally, GRDP has dominant contribution of sector for each region, for example in India and Malaysia [2,3]. The econometric model is popular to develop GRDP model.

During 2004 - 2013, GRDP of Aceh in Indonesia continues to increase. In 2007, the growth of GRDP was in a large number; 13.87% or from 1.8 trillion to 2.1 trillion. Economic growth is inseparable from the added value generated by economic units grouped by the field of business [4]. The magnitude of each sector's role describes the economic structure of the region. The economic development of Aceh Besar Regency is quite good. It is indicated by GRDP, and the high growth rate of it is higher compared to other districts in the province of Aceh.

Research on the development of the mainstay area in Aceh Besar District using data for five years shows a result that Aceh Besar district should give top priority to the construction sector, trade, hotel and restaurant sector, and services as it shows significant value in supporting the increase of GRDP



[5]. Agricultural sector which is the basic sector began to decrease its role in the economy of Aceh Besar District needs to be considered and given more support. Also, research [6] in the case study Kedungsepur states that the variable of labor negatively affects the variable of GRDP. When there is an increase of labor by 1%, it will lower the GRDP by 1.29%.

Determination of the mainstay area by base sector is a government policy that is effective enough to develop the potential of economic resources area. However, sometimes in the implementation, the concept of the development of the mainstay area is not implemented efficiently so its success can't be measured. Therefore, this study was conducted in addition to looking at the base sector in Aceh Besar district, and to see the effect of labor and other variables on the contribution of GRDP. So the government policy can be more effective and efficient in taking the step to develop economic development.

This research is intended to determine the leading sector of Aceh Besar Regency from time series data of GRDP in 2006 to 2013. And also to see the effect of several variables on the contribution of the highest percentage GRDP in Aceh Besar district. The result of this research is expected to utilized by the government and stakeholders to analyze the policy on GRDP. The data used in this study is secondary data derived from the Badan Pusat Statistik (BPS-Statistics Indonesia) years 2006 - 2013. This study uses time series data on GRDP of Aceh Besar District and Aceh Province, sector labor of GRDP, and the population of Aceh Besar district.

2. Literature Review

2.1. Methods Location Quotient (LQ)

To identify leading sectors in Aceh Besar district Location Quotient (LQ) analysis will be used. LQ analysis measures the concentration of economic activity within a region by comparing its role in the regional economy with the role of similar activities or sectors in the national economy. LQ calculation formula is often called Static Location Quotient (SLQ) because it only sees a single point in time. The LQ formula is:

$$LQ = \frac{e_{si}/e_i}{e_s/e} \quad (1)$$

where:

e_{si} = value of production sector i th at the district / city

e_i = total gross regional domestic product district / city

e_s = value of production sector i th in the province

e = total GRDP province of

The criteria measuring LQ [7] namely:

- $LQ > 1$: The rate of growth subsector i th in region k has a more rapid pace as compared to the same sector at the regional level reference p . Thus, the sector is the basis and potential for development.
- $LQ < 1$: The growth rate subsector i th in the k has a slightly slower pace compared to the same sector at the regional level reference p . Thus, the sector is not a basis.
- $LQ = 1$: Indicates if the rate of growth of the sector i th in the region k is equal to the growth rate of the same sector at the regional level reference p .

2.2. Multiple Regression Model

Regression analysis is used to model the relationship between dependent variable and explanatory variable [8]. This analysis aims to estimate the value of one variable concerning other variables known through the regression line equation. A regression model consisting of two independent variables is called multiple regression. Multiple linear regression is a linear combination analysis that explains the relationship between response variables and the explanatory factors affecting more than one predictor.

The purpose of multiple linear regression analysis is to load prediction Y over X. The form of multiple linear equations is as follows [9]:

$$Y = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki} \quad (2)$$

where:

Y is the value of the response variable in the i -th observation

X_{ki} is the value of the independent variable in the i -th observation

β_0 is an intercept parameter

β_1, β_k are parameters regression of coefficient predictors

The significance test is a procedure used to test the right or error of the results of the null hypothesis of the sample [10]. F test is conducted to find out whether the independent variables as a whole has a significant value in influencing the dependent variable. If the value of F arithmetic on the simultaneous test is greater than the value of F table or value significantly smaller than α , then the independent variables as a whole affect the dependent variable. The multi-collinearity test is performed to find out whether there is a correlation between independent variables found in the regression model. If there is a correlation, there is a multi-collinearity problem to be overcome. Multi-collinearity can be seen from the value of VIF, where if the value of $VIF > 10$ then there is multi-collinearity [10,11]. The heteroscedasticity test is performed to see the variance of the residue between observations one with the other observations. The assumption of heteroscedasticity can be detected by using the Glejser Test that regressing Independent variable with its residual absolute value. Autocorrelation test is done to see whether there is a correlation between independent variables by looking at Durbin Watson value.

3. Results and discussion

3.1. Location Quotient

This study uses data GRDP at constant prices in 2000, as it can be to analyze the seed sector and examines the economic conditions in Aceh Besar district.

Table 1. Analysis Location Quotient

No.	Business Sector	2006	2007	2008	2009	2010	2011	2012	2013	Average
1	Agriculture	1.53	1.28	1.15	1.03	0.97	0.95	0.94	0.94	1.10
2	Mining & Quarrying	0.12	0.14	0.18	0.31	0.33	0.33	0.34	0.35	0.26
3	Processing Industry	0.24	0.24	0.25	0.25	0.27	0.28	0.29	0.32	0.27
4	Electricity, Gas & Water Supply	1.26	0.90	0.74	0.83	0.76	0.74	0.73	0.73	0.84
5	Building	2.04	2.46	2.42	2.28	2.27	2.27	2.27	2.18	2.27
6	Trade, Hotels & Restaurants	1.29	1.19	1.17	1.07	1.07	1.09	1.09	1.08	1.13
7	Transportation & Communication	1.61	1.27	1.13	1.00	0.95	0.91	0.86	0.91	1.08
8	Finance, Real Estate, & Business Services	1.60	1.40	1.28	1.12	1.11	1.09	1.06	1.04	1.21
9	Offices	1.55	1.43	1.32	1.21	1.20	1.19	1.17	1.12	1.27

From the calculation of LQ in table 1. it can be seen that Aceh Besar Regency has six sectors of comparative advantage ($LQ > 1$) which are agriculture sector, building sector, trade sector, hotel and restaurant, transportation and communications sector, financial sector, and the services sector. While the other three sectors are non-base sector ($LQ < 1$) mining and quarrying sector, processing industry sector, and electricity, gas and drinking water sector. This indicates that in those six sectors, Aceh

Besar Regency has been able to fulfill their own needs and it is possible to export out of the area. For example, agricultural and plantation products in Jantho (Aceh Besar district) can be sold to Banda Aceh and other districts.

3.2. Descriptive of the Sectors

Here is presented a descriptive analysis graph of time series data GRDP in Aceh Besar district 2004 to 2013 as seen in Figure 1:

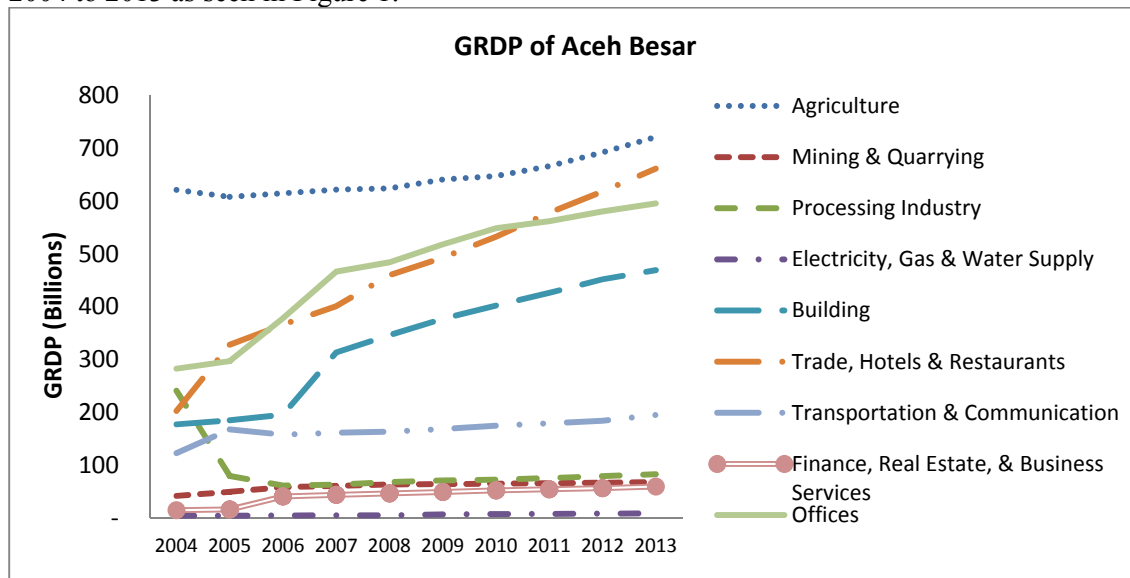


Figure 1. GRDP of Aceh Besar

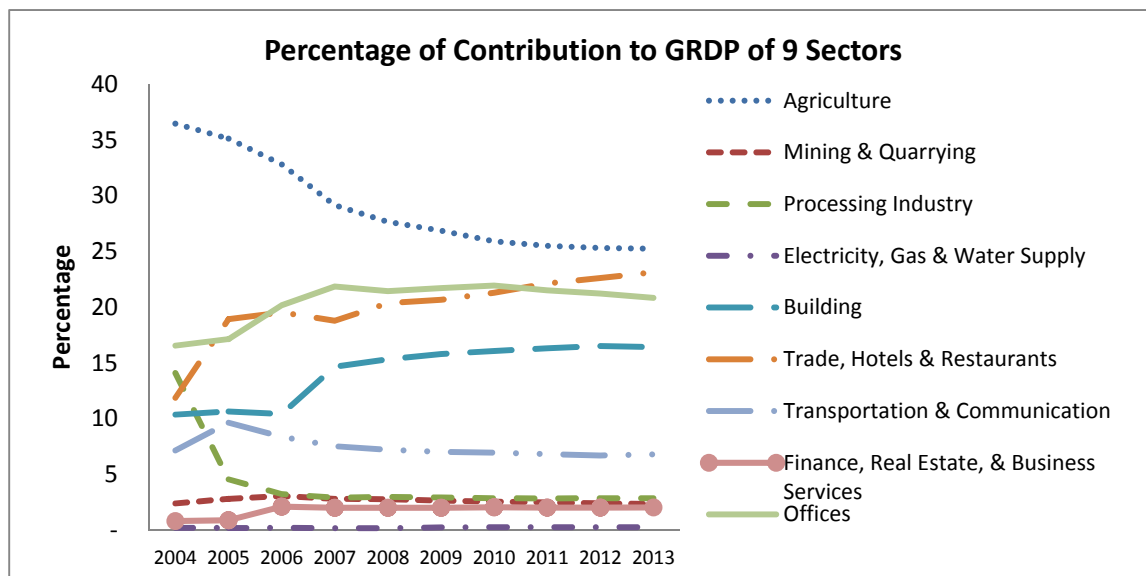


Figure 2. Percentages of contribution to GRDP of 9 sectors

There are nine sectors in GRDP: agriculture sector, mining and quarrying sector, manufacturing industry sector, electricity, gas and water sector, building sector, trade, hotel and restaurant sector, transportation and communications sector, financial sector, and company services, and the services sector. From 9 sectors, there are eight sectors which increased from 2004 to 2013, while the manufacturing industry sector decreased drastically in 2005 from Rp. 240.5 billion to Rp. 79.2 billion. Furthermore, increase from 2006 to 2013 to Rp. 82.3 billion. This decline related to the disaster that hit the coastal area of Aceh in 2004 that tsunami. The PT SAI factory (renamed Lafarge Cement

Indonesia) became one of the main contributors of the industrial sector in the cement subsector, destroyed by the tsunami waves, resulting in a decline in the manufacturing sector.

The agricultural sector and trade sector are the two largest sectors that contribute to GRDP. In 2013 the agricultural sector contributed Rp. 721.6 billion or about 25.23% of the formation of GRDP Aceh Besar District. The contribution decreased if compared to 2004 which is about 36.44%. While the trade sector in 2013 contributed Rp. 661.4 billion or about 23.13%. The contribution of the trade sector increased rapidly when compared to the year 2004, i.e., 11.88%.

3.3. Multiple Regression Model

The results of the descriptive analysis show that the percentage contribution of agricultural sector decreased every year and the trade sector increased. We found the case interesting to do further analysis such as regression analysis. The goal is to see the effect of some variables on contribution percentage of both sectors. Results of the assumptions that must be met in the regression analysis are:

Table 2. Test the assumptions on regression

No	Sector	Normality Test	Multi-collinearity Test	Heteroscedasticity Test	Autocorrelation Test	
		Kolmogorov Smirnov	VIF	Test Glejser	Durbin Watson	RunTest
1	Agriculture	0453	1,312	0.2629	2,397	1
2	Trade, hotels, and restaurants	0.64	3365	0065	2677	0703

For normality test, agriculture sector and trade, hotel, and restaurant sector should have a significant value $> \alpha$ (0.05) to fulfill assumption and can be concluded as a normal distribution. In the multi-collinearity test, the two sectors have VIF value < 10 , so there is no multi-collinearity. In the heteroscedasticity test, the two sectors have significance value $> \alpha$ (0.05), so it can be concluded that there is no heteroscedasticity. The autocorrelation test of both sectors has Watson Durbin value in the area so these can't be concluded. Therefore, it is necessary to do a further test with a run test to see the residual randomness. Because the value of run test $> \alpha$ (0.05) then the data used is quite random so there is no problem autocorrelation.

The data of agricultural sector and trade sector, hotel, and restaurant have fulfilled the assumption so the regression analysis can be done. Parameter test conducted in this research is by using simultaneous test (F test). Here is ANOVA table for simultaneous test:

Table 3 Table ANOVA model agricultural sector

Model	Sum of Square	df	Mean Square	F	P-value
Regression	41.637	2	20.818	18.476	0005
Residual	5,634	5	1,127		
Total	47 271	7			

Labor variable and population have significant value $(0.005) < \alpha$ (0.05). This means that labor in the agricultural sector and the number of people (population) affect the contribution of the agricultural sector. The formulation obtained by agriculture sector:

$$Y = 64.1123 - 0.0002 (\text{labor}) - 0.00008611 (\text{population})$$

This means that every addition of 1 labor force in the agricultural sector then the contribution of the agricultural sector will be reduced by 0.0002%. For each addition of 1 soul of the population then the contribution of the agricultural sector will be reduced by 0.00008611%.

Table 4. Table ANOVA on the model of trade, hotels, and restaurants

Models	Sum of Square	df	Mean Square	F	P-value
Regression	15 274	2	7637	46 889	0001
Residual	0814	5	0163		
Total	16 089	7			

The variable of labor and population have significant value $(0.001) < \alpha (0.05)$ This means that the labor force in the trade, hotels, and restaurants sector and the number of people influences the contribution of trade, hotel, and restaurant sector. The formulation of the contribution of trade, hotel, and restaurant sector are:

$$Y = 13.7571 + 0.000014157 (\text{labor}) + 0.0000013786 (\text{population}).$$

It means that every addition of 1 labor force in the trade, hotel and restaurant sector then the contribution of trade, hotel, and restaurant sector will increase by 0.000014157%. For each addition of a person of the population then the contribution of trade, hotel, and restaurant sector will increase by 0.0000013786%. If we compared to agriculture sector and the trade, hotel and restaurant sector then both has different direction. However, both sectors have potency to build and explored to get large contribution to increase GRDP in Aceh Besar in the future.

4. Conclusion

Leading sector in Aceh Besar is agriculture, building sector, trade sector, hotel and restaurant sector, transportation and communications sector, financial sector, leasing and business services, and services sector. So, the local government should give more attention and contribute to mentioned the six sectors.

Labor variable in the agriculture sector gives negative effect to the contribution of the agriculture sector. It means that every additional labor and population then the contribution of the agricultural sector will decline. Therefore, the government should contribute more to the agricultural sector, given the agricultural sector is the largest field for society as farmer and gives largest contribute to GRDP for Aceh Besar district.

Whereas, the labor variable in the trade, hotels, and restaurants sector and the number of residents positively affect the trade, hotels, and restaurants sector. Each workforce and price then the trade, hotel and restaurant sector will go up. It shows that this sector can become a leading sector in Aceh Besar district.

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