



## Analysis of Factors Affecting the Production and Price of Coffee Arabica to Competitiveness in Central Aceh District

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### **Abstract**

This research aims to determine the factors that affect the production and price of Arabica coffee against the competitiveness in the central Aceh district, in this case the suspected variables are one of the factors affecting the production and price of coffee Category, for that use dummy variables are done in order not to occurrence of error draw conclusions. Methods used are methods of regression analysis of multiple linear dummy and policy Analysis matrix. Results obtained from 71 researched samples showed several factors significant effect on the production of coffee and the selling price of Arabica coffee in central Aceh District, there are 5 factor that influenced the production of coffee and there are two factors Significantly affects the selling price of Arabica coffee. And The value of  $DRCR < 1$ , prove coffee farming in central ACEH in order to produce a unit of production at social prices requires only 0.66 The cost of domestic resources on social prices.

**Keywords:** Analisis Regresi Dummy; Policy Analysis Matrix

### **Introduction**

Coffee is a commodity in the plantation sub-sector which has the opportunity to be developed in the context of efforts to increase state revenues and increase the income of entrepreneurs and farmers. Aceh Province as the second largest producer of Arabica coffee in Indonesia in 2015 reached 41.85 thousand tons which was distributed 100% in only 3 districts, the most dominant in Central Aceh District with production of 29.24 thousand tons. According to the Gayo Coffee Protection Society (MPKG 2009) Gayo coffee production covers more than 90% of the total coffee production in Aceh Province. The Indonesian Coffee and Cocoa Research Center (PPKKI 2008) states that the area of Gayo coffee plantations in each district in the Gayo Highlands is 46,000 ha Central Aceh, 37,000 ha Bener Meriah, and 4,000 ha Gayo Lues.

The main objective of managing a coffee farm is to increase production so that the income of coffee farmers also increases, therefore farmers as business managers must understand how to allocate resources or factors of production so that these objectives can be achieved. Based on the foregoing, it is necessary to provide guidance through growing interest and improving the system of community coffee growers in Central Aceh District. Efforts to improve a decent life for farmers must be supported by the

local government, especially in terms of improving coffee commodity trading activities, because the amount of farmers' income is largely determined by the establishment of the selling price. Improvement of coffee quality must also be done, because coffee quality greatly influences price stability. The high selling price of coffee can increase the income of coffee farmers who are generally still relatively low.

### ***Research Objectives***

The purpose of this research to analyse the factors affecting the production of coffee in central Aceh district on coffee farming. And also to analyzes the relationship of production and price to the competitiveness of coffee farming in central Aceh district.

### ***Research Methods***

This research was done intentionally, namely in central Aceh District in Aceh province. Location selection based on regional considerations which is the main producer of coffee and the majority of the local community is coffee farmers and also most of the time allocated to coffee farming and most of its revenue is derived of coffee farming. Primary data retrieval is done with the questionnaire and interviews involving the characteristics of farmers and the state of the coffee farming. Characteristic of the state of coffee farming is the area of coffee farming, the number of coffee crops, coffee plantation age, the type of seedlings, maintenance, and post-harvest processing up to the marketing and the amount and value of the production of coffee obtained From a sample farmer.

The application of multiple linear analysis methods is done to determine the factors that affect the amount of coffee production and the factors that affect the selling price of the coffee. Analysis of these factors using multiple linear regression analyzers where the independent variables in the form of category or ordinal data will be analyzed using dummy variables. Then analysis of Policy Analysis Matrix (PAM) to know the production and price of coffee affects the competitiveness in central Aceh district. The level of competitiveness of the production and commodity prices of arabica coffee is thoroughly visible from the value of competitive advantage (PCR) and Comparative Excellence (DRC) (Monke and Pearson, 1995).

### ***Research Population and Samples***

Of the 14 sub-districts located in central Aceh District, the research was focused in 3 sub-districts which are the highest-level Arabica coffee, namely Pegasing, Atu Lintang, and Jagong Jeget district. The population in this study was the coffee farmers in the third region of the sub-district, amounting to 11956 people. Related to the samples taken, this study used proportional random sampling techniques. Obtained a sample of 71 farmers, where 19 farmers in pegasing subdistrict, 32 farmers in Kecamatan Atu latitude and 20 farmers subdistrict Jagong Jeget.

### ***Technique of Data Analysis***

Regression analysis is a statistical technique used to describe and modeling the relationship between dependent variables and independent variables. Regression models that load  $k$  independent variables and one dependent variable are called multiple linear regression models. Common forms of multiple linear regression are as follows:

$$Y_i = b_0 + b_1X_{1i} + b_2X_{2i} + b_3X_{3i} + b_4X_{4i} + \dots b_kX_{ki} + \varepsilon_i$$

Description:

$Y_i$  = dependen variable

$X_{ki}$  = independen variable

$b_1, \dots, b_k$  = regression parameters

$\varepsilon_i$  = error

For category-independent variables or dichotomy, it will be declared as a dummy variable. A dummy variable is an independent variable whose form is non-metric or category-scale, by giving it a 0 or 1 code. Each dummy variable states one category variable, and each variable with  $k$  category can be expressed in  $k-1$  dummy variable, (Gujarati, 2004:340). Dummy variables that will be used in independent variables are different types of seedlings, quality of coffee, and post harvest processing techniques. Note the following models:  $Y_i = \alpha_0 + \alpha_1 D_{1i} + \alpha_2 D_{2i} + \alpha_3 D_{3i} + \beta X_i + \varepsilon_i$

with:  $Y_{Production}$  = Arabica coffee beans Production

$X_2$  = Types of seedlings

$D_1$  = 1 if ateng super, 0 else

$D_2$  = 1 if gayo1, 0 else

$Y_{Selling price arabica coffee}$  = Selling price arabica coffee

$X_2$  = Quality Coffee

$D_1$  = 1 if Gelondongan, 0 else

$D_2$  = 1 if Gabah, 0 else

$X_5$  = Teknik pengolahan pasca panen

$D_1$  = 1 if 8 step, 0 else

$D_2$  = 1 if 5 step, 0 else

$D_3$  = 1 if onestep, 0 else

Policy Analysis Matrix (PAM) is a quantitative analysis based on two sets of commodity budgets, i.e. using a budget set of financial/private prices (markets) and a set of social/economic price budgets (Pearson, 2003). By conducting a Policy Analysis Matrix (PAM) analysis can know the competitive advantages (PCR) and comparative advantages (DRC) or the competitiveness of Arabica coffee commodities thoroughly, (Monke and Pearson, 1995). The general form of PAM is as follows;

**Table.1 Policy Analysis Matrix (PAM)**

Description	Acceptance	Input		Advantage
		Input Tradable	Domestic factors	
<i>Privat Cost</i>	A	B	C	D
<i>social Cost</i>	E	F	G	H
Divergence effect	I	J	K	L

with:

1. Privat Advantage :  $D = A - B - C$
2. social Advantage :  $H = E - F - G$
3. *Out transfer* :  $I = A - E$
4. *Input transfer* :  $J = B - F$
5. *Factor transfer* :  $K = C - G$
6. Net Transfer :  $L = D - H$  or  $L = I - J - K$

Table above can be used for analysis:

1. Privat Profitability (D) = A- (B+C)
2. Social provitability (H) = E –(F + G)
3. *Privat Cost Ratio* (PCR) = C/(A - B)
4. *Domestik Resource Cost Ratio* (DRCR) = G/(E - F)

### Results and Discussion

The characteristic of coffee farming in Aceh is seen based on three sub-districts, Pegasing subdistrict, Atu Lintang and Jagong Jeget. This subdistrict is the highest coffee producing sub-district. The average age of coffee farmers is 43 years old with a range of 22 – 60 years. The area is directed by an average of 1 ha. In these three sub-districts coffee farming can produce the fewest coffees of 500 kg of coffee beans and most produce 1250 kg of coffee beans in a year. With the minimum selling price of coffee in the form of a log is appreciated 10,000 (Rp) and the selling price of the maximum coffee beans in the form of packaging ready to be marketed at 70,000 (Rp).

**Table 2. Multiple regression analysis results with dummy variables for production factors.**

Model	ParameterS	<i>T</i> value	<i>P</i> value	VIF	Conclusion
Constan	-541.725	-9.041	.000		
$X_1$	113.950	2.306	.024	3.137	Significant
$X_3$	.652	12.593	.000	2.787	Significant
$X_4$	2.971	2.019	.048	2.577	Significant
$X_5$	.520	12.964	.000	1.482	Significant
$X_6$	2.326	1.897	.062	1.456	Not Significant
$X_2$ (Gayol)	-58.901	-3.281	.002	1.768	Significant

$$Y = -541.725 + 113.950X_1 - 58.901X_2 + 0.625 X_3 + 2.971X_4 + 0.520X_5 + 2.326X_6 + \varepsilon$$

The above equation can be concluded as follows:

1. If other variables are constant value then the production value of Arabica coffee beans will increase as much as 113.96 per unit of land area (ha).
2. If other variables are constant value then the production of Arabica coffee beans will increase by 0.652 per one unit of number of plants.
3. If other variables are constant value then the production of Arabica coffee beans will increase by 2.971 per one unit of age of the plant.
4. If other variables are constant value then the production of Arabica coffee beans will increase by 0.520 per one unit of fertilizer amount.
5. If other variables are constant value then the production of Arabica coffee beans will be reduced by 58,901 per one unit of seed type. Production of Arabica coffee beans by using a type of seedlings gayol lower compared to the type of super Ateng seeds.

**Table 3. Multiple regression analysis results with dummy variables for the selling price of coffee.**

Model	Parameters	<i>T</i> value	<i>P</i> value	VIF	Conclusion
Constan	50000.000	13278148.021	.000		
$X_1$	7.086E-014	.000	1.000	1.277	Not Significant
$X_2$	-20000.000	-118516882.719	.000	1.260	Significant
$X_3$	2.326E-014	.000	1.000	3.272	Not Significant
$X_4$	1.024E-015	.000	1.000	2.247	Not Significant
$X_5$ (8 step)	40000.000	117818995.999	.000	2.367	Significant

$$Y = 50000 + 7.08 e^{-14} X_1 - 20000 X_2 + 2.32 e^{-14} X_3 + 1.02 e^{-14} X_4 + 40000 X_5 + \varepsilon$$

The above equation can be concluded as follows:

1. If other variables are constant value then the selling price of Arabica coffee will be reduced by Rp 20,000 per one unit of coffee quality. If the quality of coffee sold is still in the type of logs then the selling price of the coffee will be reduced, so with the selling price if the quality of coffee in the type of grain or ready market, will increase the selling price of the coffee.
2. If other variables are constant value then the selling price of Arabica coffee will increase by Rp 40,000 per one unit of post-harvest processing. It means that the stage in processing the harvest is very significant affect the selling price of Arabica coffee. The more complete post-harvest processing stage the higher the selling price of Arabica coffee.

**Table 4. Policy Analysis Matrix (PAM)**

Description	Acceptance	Input		Advantage
		Input Tradable	Faktor Domestik	
Privat cost	1,969,492,957,746	682,697,535,211	520,850,000,000	765,945,422,535
social cost	1,213,126,760,563	682,697,535,211	269,421,126,760	261,008,098,591
Divergence effect	756,366,197,183	0	251,428,873,239	504,937,323,943

Based on the results of enumeration known that the productivity of coffee averages 910.56 kg/ha with a relatively good price of Rp 29154/ha.

The table above shows that the individual income of coffee farming in central Aceh is Rp. 765,945,422,535 per hectare. Private gains are an indicator of the competitiveness of coffee commodity systems based on technology, input values, input costs and transfer of existing policies. The results obtained  $D > 0$  ( $765,945,422,535 > 0$ ), means that the commodity coffee system to gain profit on the normal costs that have implications that the commodity of coffee is able to export.

It is then reviewed from the social advantage which is an indicator of the comparative advantage of the commodity coffee system in the condition that there is no divergence either due to government policy as well as market distortion. The result obtained  $H > 0$  ( $261,008,098,591 > 0$ ), means the commodity system of coffee gained profit on the normal cost in social price and has comparative advantage.

Coffee farming in central Aceh shows a competitive system, the establishment of a system to pay the cost of domestic resources and remain competitive is indicated by the value of  $PCR < 1$ , ( $7/9 < 1$ ). From the calculation result is also known that PCR or financial cost ratio 0.77 means that commodity coffee still has a competitive advantage although relatively low, so to produce one unit of production at the financial price. It takes 0.77 a financial domestic input fee.

Reviewed in terms of the DRCCR value or the domestic resource cost ratio of 0.66 means that coffee farming has a comparative advantage (DRCCR value  $< 1$ ), meaning to produce one production unit at social price requires only 0.66 resource costs On social prices. The smaller the second value of the higher the competitiveness.

## Conclusion

Based on the description of the results and the discussion can be concluded:

1. Factors affecting the production of Arabica coffee beans is the area of land ( $X_1$ ), the type of seed ( $X_2$ ), the number of plants ( $X_3$ ), Age of Plants ( $X_4$ ), and the amount of fertilizer ( $X_5$ ).
2. Factors influencing the selling price of Arabica coffee is the quality of coffee ( $X_2$ ), and the post-harvest processing technology ( $X_5$ ).
3. The financial income of coffee farming in Central Aceh District is positively worth the meaning that the coffee farming business gives a financial benefit to the farmer. The value of DRCCR  $< 1$ , prove coffee farming in central Aceh in order to produce a unit of production at social prices requires only 0.66 the cost of domestic resources on social prices.

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