

# Mega Aktiva: Jurnal Ekonomi dan Manajemen

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## FACTORS AFFECTING THE ECONOMIC POLICY OF FOOD IN INDONESIA

Asriani<sup>1</sup>, Dhian Hedhiansyah<sup>2</sup>

<sup>1</sup>Faculty of Agriculture, Muhammadiyah University of Kendari  
Kendari 93711, Sulawesi Tenggara  
*asriani\_umk@yahoo.co.id*

<sup>2</sup>Faculty of Agriculture, Halu Oleo University  
Kendari 93711, Sulawesi Tenggara  
*herdhiansyah\_ftip.uho@gmail.com*

### ABSTRACT

Food security is one indicator of economic growth of a country and may reflect the prosperity as well as a benchmark of the the welfare level, particularly in terms of people's production and consumption. Food security policies need to be supported through increased production of commodities. Corn is one crop with a strategic role due to its position as the main source of carbohydrates and protein. To increase the production of corn, there should be the policy inputs or factors of production done by increasing the planting area and the productivity of corn crops in Indonesia. This study aims to analyze the factors of production that can increase the production of corn farming. The data used are time series data with Nerlove model as the data analysis way. The results indicate that the harvest area factor and productivity factor may influence the increasing of farm production of corn; it thus can serve as the basis of economic policy-making related to the food sector in Indonesia.

**Keywords:** Production; Corn; Partial Adjustment Model.

### I. INTRODUCTION

According to the food law no. 18 of 2012, food sovereignty is the right of the state and nation to independently determine food policies that guarantee the right to food for the people and that gives the community the right to determine food systems in accordance with the potential of local resources (Yuwono, 2015). Also food security refers to a condition of fulfilling food for the country included every individual need which is reflected on the availability of sufficient food; both in quantity and quality, safety, diversity and nutritiousness, even distribution and affordability, and it does not violate the rules of religion, beliefs and culture so that the people are able to live in a healthy, active, productive, and sustainable way (Arifin, 2015). Meanwhile, food independence is the ability of a country and nation to produce diverse food within the country that can guarantee the fulfillment of sufficient food needs at the individual level by utilizing the potential dignified natural, human, social, economic and local resources. The transformation process of the agricultural sector that is capable of producing agricultural production or surplus at the domestic level in large numbers is also considered as a basic condition for economic growth, development of identity and identity of a nation (DG Crops, 2012).

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Corn farming is considered a potential development in Indonesian farming because of the following benefits;

## 1. Consumption Needs (food)

Along with the increasing population, the need for corn for consumption also continues to increase as it is known that Indonesia's population has increased by an average of 1.3 percent per year. With this increase, it will automatically increase the amount of livestock consumption (meat) which has a direct impact on corn needs as feed raw material livestock. It is also known that in some regions in Indonesia still use corn as a staple for consumption such as in several regions in Nusa Tenggara and Sulawesi.

Food needs always to follow the trend of population numbers and is influenced by the increases in per capita income and changes in people's consumption patterns. This phenomenon indicates that food diversification is needed to support the stabilization of food self-sufficiency. From this condition, two things must be fulfilled; the provision of foodstuffs and diversification of foodstuffs.

## 2. Corn Needs for Animal Feed

As for other benefits of corn as raw material for the feed industry, the role of corn commodities as animal feed raw materials has not been replaced at this time. The corn component in animal feed raw materials has the highest proportion compared to other constituent components. According to Tangendjaja (2002), the composition of feed derived from corns is aimed to the broilers for 54 percent and to the laying hens for 47.14 percent. Thus the function of corn for feed is very important. The relatively high use of corn is due to its relatively cheap price, high calorie content, having complete amino acid protein, easy to produce, and popular with livestock.

## 3. Corn Consumption for Other Needs

Aside from being a raw material for animal feed, currently food products from corn are also developing in the form of corn flour for the people of Indonesia and have become daily consumption. These products are widely used as raw materials for the manufacture of food products. Usually corn is made in the form of food such as corn, corn porridge, rice mixed corn, and many other traditional foods derived from corn. With the market potential of corn, it certainly opens opportunities for farmers to grow corn or increase the corn production. Another use of corn is for industrial needs. In the market, there are many circulating corn processed products. The processed corn products generally come from household scale industries to large industries. The processing industry includes dry milled industry to produce corn flour, wet milled industry to produce syrup, corn sugar and corn oil.

## 4. Corn Needs for Ethanol Raw Materials

The conversion of corn into biofuels (ethanol), which for a decade has become a trend in developed and developing countries, has caused a shortage of corn in the world because some of the world's largest corn-producing countries, such as the United States, have reduced corn exports because of fulfilling domestic needs. As a result, the demand for corn is increasing which in turn will increase domestic prices. The increasing domestic prices will encourage an increase in domestic corn production. Therefore, this is an opportunity for farmers to increase the income from corn farming.

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## II. THEORITICAL STUDY

### Corns

Corns were originated from Peru, Ecuador, Bolivia and Southern and central part of America, which are high-potential superior agricultural commodities. This plant is widely planted in the temperate and tropical areas which become the staple food of the local population as well as animal feed. As a food ingredient, corn has a high nutrient content, especially carbohydrates. In addition, corn also contains sugars, calcium, acidic corn, and fatty oils. Young fruits contain a lot of protein, fat, calcium, phosphorus, iron, sulfur, vitamins A, B1, B6, C, and K. The corn hair contains fatty oils, dammar, sugar, maisenat acid, and mineral salts. Besides, corns can be made maize or corn flour or cornstarch (Rukmana, 1997).

### Partial Adjusment Model (PAM)

The study of agricultural commodity offers has been carried out ubiquitously, by developing various analysis models, both in trend analysis and econometric models. One model used to analyze the response of agricultural commodity offers is the Nerlove model. Domestic production can be estimated by using the direct production function, where total production is a function of harvested area, price of the commodity in question, competitor commodity prices, input prices, and technology. However, Gemill (1978) in existence argues that the direct production function has weaknesses, including: (a) involving more variables so that multiple colloquialities often occur between variables, (b) the area response function and productivity function (yield response) are two different functions, although both are influenced by price. The price response in both functions is different, so it must be estimated separately. Therefore, the indirect approach to using harvest area functions and productivity functions, as well as the Nerlove approach, is more representative of factual conditions. Another advantage of using indirect functions is that in parameter estimation, this approach is more efficient than the direct approach. Changes in crop area and productivity of food crops are not only determined by the price of the commodity in question, also by other factors such as irrigation, and technology, especially in the system of food crops in Asia. Besides being more in line with reality, it is also intended to avoid bias in estimating the effect of prices on supply because it ignores these factors.

## III. RESEARCH METHODOLOGY

The data used is time series data from 1980 to 2017. The problems in this study were analyzed in two methods; quantitative and qualitative analysis. The quantitative analysis is in the form of an analysis of the main variables or factors that influence the response of corn commodity supply through the productivity response function of corn commodity harvesting and the productivity of corn commodities. The analysis of the response of corn commodity supply in this study uses the partial adjustment model (PAM) method, known as the Nerlove partial adjustment model that is often used for studies of the supply response of various commodities in the form of a single multiple regression equation with a double natural logarithmic or natural logarithm (ln) function

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using the technique of estimating ordinary least square (OLS). The obtained data will be analyzed using eviews program (Widarjono, 2009)

The variables considered affecting the productivity of corns are prices, the level of application of technology as a major factor in changes in the productivity of the refined in the price of urea, the price of pesticides, and the productivity of the previous year crops. In this study, the price of corn and the price of inputs used have been released.

The equation of corn productivity function is as follow:

$$Y_t = f(HJG_{t-1}, HPUK_{t-1}, HPST_{t-1}, Y_{t-1}, ut)$$

Therefore, the econometric model of the corn productivity response is

$$Y_t = d_0 + d_1 HJG_{t-1} + d_2 HPUK_{t-1} + d_3 HPST_{t-1} + d_4 Y_{t-1} + ut \dots\dots\dots (1)$$

$$\ln Y_t = d_0 + d_1 \ln HJG_{t-1} + d_2 \ln HPUK_{t-1} + d_3 \ln HPST_{t-1} + d_4 \ln Y_{t-1} + ut \dots\dots\dots (2)$$

The final expected value can be counted as follow:

$$d_1, d_4, > 0 ; d_2, d_3 < 0$$

Note:

- $Y_t$  : the corn production in year t (Ton/Ha),
- $HJG_{t-1}$  : the corn prices of the previous year (Rp/Kg),
- $HPUK_{t-1}$  : the fertilizer process of the previous year (Rp/Kg),
- $HPST_{t-1}$  : the pesticide prices of the previous year (Rp/Kg; Rp/Ltr),
- $Y_{t-1}$  : the corn productivity in year t-1 (Ton/Ha),
- $ut$  : the standard deviation in year t

The function equation of the corn farming areas is:

$$A_t = f(HJG_{t-1}, HKD_{t-1}, HPD_{t-1}, HUK_{t-1}, A_{t-1}, ut)$$

$$A_t = b_0 + b_1 HJG_{t-1} + b_2 HKD_{t-1} + b_3 HPD_{t-1} + b_4 HUK_{t-1} + b_5 A_{t-1} + ut \dots (3.1)$$

The final expected value is:

$$b_1, b_3, b_5, b_6, b_7 > 0 ; b_2, b_4 < 0$$

Note:

- $A_t$  : the square of corn farming area in year t (Ha)
- $HJG_{t-1}$  : the real price of corns in the previous year (Rp/Kg)
- $HKD_{t-1}$  : the real price of soya in the previous year (Rp/Kg)
- $HPD_{t-1}$  : the real price of rice in the previous year (Rp/Kg)
- $HUK_{t-1}$  : the real price of cassava in the previous year (Rp/Kg)
- $A_{t-1}$  : the square of corn farming area in the previous year (t-1)

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## IV. RESULTS

Based on the estimation results of corn production in Indonesia obtained, the econometric testing was carried out to determine whether the estimated parameters violated the classic OLS assumptions. Of the three econometric tests, the response model of corn productivity in Indonesia has no problems in the assumption of multicollinearity, autocorrelation, and heterocedasticity. To find out how much influence the independent variables partially on the dependent variable, the statistical t-test is used. The partial test results of the factors that affect corn productivity in Indonesia are as follows:

### Corn Productivity in The Previous Year

The variable of lag productivity has a significant effect. Positive influence means that productivity of corn is currently a continuation of productivity of corn crops before, farmers respond by increasing current productivity based on productivity of the previous year.

### Real Price of Corn

The variable of the previous year's real corn price has a positive effect which means that the increase in corn prices will increase the productivity of corn. This is in accordance with the existing theory and farmer's rationality where if there is an increase in domestic corn prices then there will be additional incentives for farmers, so farmers will act to increase the amount of corn production by increasing corn productivity and optimizing the use of production inputs.

### Real Price of Urea Fertilizer

The variable of urea fertilizer price has a positive sign that is not in accordance with the hypothesis and does not significantly influence the increase in corn productivity. Urea fertilizer is the main fertilizer needed in corn farming because urea fertilizer plays an important role especially when growing corn plants. Urea fertilizers contain elements of Nitrogen (N) which are macro elements needed by plants. Macro elements are elements needed by plants in large quantities and if corn plants lack this element, they will experience deficiency symptoms in these plants. The results of this analysis are also in line with Puteri's findings (2009) that the price of urea fertilizer is positively related to the productivity.

### Real Price of Pesticides

The variable of real pesticide price, although not significant, has a negative effect on the corn productivity. Pesticide variables are not significantly affected because currently corn farmers still apply traditional methods to control pests and diseases, because corn is one of the plants with little risk in attacking plant pests, plus the use of superior seeds and composites that are resistant to pests and disease, so that pesticides are not needed in a big amount by corn farmers. To find out how much the independent variables influence the dependent variable partially, the statistical t-test is used. The

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results of the partial test of factors that affect the corn harvest area in Indonesia are as follows:

### **Real Price of Corn**

The real price of corn last year had a positive effect, which means that if the price of corn will be responded to by farmers by increasing the harvested area. This indicates that the price of corn is a benchmark for farmers in allocating their planting areas which will eventually expand the corn harvest area.

### **Real Price of Rice**

Variables of last year's real rice prices have a positive effect according to the hypothesis. The above conditions occur because of differences in seasonal cropping patterns between corn and rice, corn plantations in Indonesia. Thus it can be concluded that rice does not affect the area of corn harvest due to differences in cropping patterns.

### **Real Price of Soybean**

From the regression estimation results, the real price of soybean variable has a negative effect obtained in accordance with the research hypothesis. It indicates that corn and soybeans are competitive plants, these results are in accordance with the findings of Hapsari (2007) which indicates that soybeans is a competitive plant of corns in utilizing the farming areas.

### **The Real Price of Cassava**

The real price of cassava has a positive effect on the area of corn. It shows that farmers strongly respond to the real price of cassava to increase the area of corn harvest, from the results obtained in accordance with the research hypothesis, that cassava is a competing plant for corn. Corn and cassava are usually planted on dry land, so corn and cassava can be competitive in terms of land use. The increase in cassava prices is currently triggered by the increasing demand for cassava as a raw material for food, feed, and fuel as well as corn. The results of this analysis are also in line with Puteri (2019) findings that the price of corn has a negative effect on cassava harvested area.

### **Harvest Area of Previous Year**

The variable area of the previous year has a positive effect in accordance with the hypothesis. This is understandable because according to available data, during the study period the corn harvest area in Indonesia had not changed much. The growth of harvested area which tends to slow down is due to the limited ownership of farming land by farmers, and the rate of land conversion from agriculture to non-agriculture from year to year continues to increase. Besides, the allocation of corn farming land is still competing with other food crops. Therefore, the area of the previous year's harvest area is not used as the reason of farmers to increase the harvested area of corn farming (Asriani, 2013).

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### V. CONCLUSION

Based on the above results, it can be concluded that the factors that influence the farming of corn production in Indonesia are productivity factors and factors outside the harvest area. These factors can be used as a policy base in increasing corn production in Indonesia in order to create sustainable food self-sufficiency.

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