



Analysis of the Effect of Harvest Area, Agricultural Credit, Labor, on Food Production (Rice and Corn) in North Sumatra

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ABSTRACT

The title of this research is to analyze the influence width on farm, credit banking of agriculture sector and man power of agriculture sector in influencing of rice and maize product in North Sumatra. The data used is time series in the period of 1988-2007. The method used ordinary last square (OLS). The result of the research shows that the influence width on farm, credit banking of agriculture sector and man power of agriculture sector is influence which are positive to product domestic rice and maize and statistically significant at 5 % .

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1. INTRODUCTION

The development of food security in accordance with the mandate of Law No. 7 of 1996 concerning food, aims to realize the availability of food for all households, in sufficient quantities, of proper quality and nutrition, safe for consumption, evenly distributed and affordable by every individual.[1], [2]. Food is the most essential basic need for humans to sustain life and life. In accordance with the times, the way to fulfill food needs has also changed, starting from the use of extractive natural resources to permanent agricultural cultivation as is done today, where humans always find ways to fulfill their food life.[3], [4].

Increased food production is expected to maintain national food security, considering that food security is closely related to social security, economic stability, political stability and security or national security.[5]. In addition, food security is also closely related to efforts to improve the quality of Indonesian human resources. Without the support of quality and sufficient food, it is impossible to produce quality human resources. On the other hand, ignoring food security means talking about the low quality of human resources. Therefore, building a solid food security system is an absolute requirement for the implementation of national development[6], [7].

Efforts to realize food security and its various problems will continue to be an issue as long as human life continues. The right to food is inherent in every individual throughout life. The prerequisite for this is that sufficient food availability at the local level will be more secure if it can be met from local resources, or fulfilled through cooperation between locations or between regions.[8].

In the development of society's civilization to meet the quality of life that is more advanced, independent in a peaceful atmosphere, as well as physically and mentally prosperous, it is increasingly

demand to provide sufficient, quality, and equitable food. Therefore, food sufficiency for a nation is a very serious matter. A publication from the United Nations agency for food and agriculture (FAO) states that Indonesia is one of the countries that are threatened with food insecurity. This is a warning and the government must take strategic policies in the field of food and agriculture[9], [10].

At this time, food and energy are increasingly becoming the world's strategic commodities. The large population and efforts to increase maximum nutrition in each country are getting higher. At the same time, economic activity is getting more intensive, so it requires a lot of energy. In recent years, the issue of food security has become an important issue in Indonesia, especially when it is associated with natural disasters[11], [12].

The increase in rice production is intended to maintain the availability of food as a source of energy and protein which is still predominantly fulfilled by food sources of carbohydrates, especially rice[13]. Rice, which is a strategic commodity, plays an important role in the economy and national food security and becomes the main basis for revitalizing agriculture in the future. In line with population growth, the demand for rice in the 2005-2025 period is projected to continue to increase at an average rate of 5.7% per year. It is undeniable that rice has a very strategic role in utilizing food security, economic security, and political stability. This is shown by the government's efforts to always maintain the domestic rice stock in order to maintain a surplus. This is done to keep the possibilities that occur in the future[14], [15].

The increase in food production in North Sumatra, especially rice production in producing rice production, is not as fast as the increase in population. As a result, there is an imbalance between the demand for rice and the availability of rice, which will result in an increase and dependence on rice imports[16]. The development of harvested area and production in North Sumatra experienced ups and downs where in 2005, the amount of rice production decreased from 3,447,379 tons to 3,007,686 tons in 2006, and increased again in 2007 by 3,265,834 tons. If this continues, it is feared that food insecurity will occur given the increase in population every year, considering that rice is a food habit of Indonesian people.

If broken down by district/city, Simalungun and Serdang Bedagai districts are centers of rice production in North Sumatra. In 2006 the production of rice in Simalungun Regency was 367,793 tons or 11.15% of rice production in North Sumatra. Meanwhile, rice production in Serdang Bedagai Regency in the same year reached 381,808 tons or 12.23 of rice production in North Sumatra (North Sumatra in Figures 2008).

In addition to rice production, corn is one of the strategic commodities and has economic value, and has the opportunity to be developed because of its position as the main source of carbohydrates and protein after rice, besides that corn acts as animal feed, industrial and household raw materials[17]. In recent years the demand for corn has continued to increase, this is in line with the increasing rate of population growth and the increasing need for feed. On the other hand, maize production growth is still sluggish due to the low level of productivity and planted area, causing an imbalance between production and domestic demand. Corn is a food crop commodity that has a strategic role in the development of agriculture and the Indonesian economy. This commodity has a multipurpose function, both for food and feed. The use of corn for feed reaches 50% of the total demand. In the national economy, corn is placed as the second largest contributor after rice in the food crop sub-sector.

The increasing demand for corn for feed is driven by the development of animal feed production, which has recently grown to 10 percent annually.[18]. Because of the importance of the function of this corn commodity, PT Benih Inti Suburintani (2002) predicts that in the next 10 years the need for corn, both for feed and for other industrial raw materials, will increase from the current 9 million tons to around 19 million tons. To meet this demand, besides being met from domestic production, it also comes from imports. Considering the fact that in the last 5 years the development of increasing the planted area of corn has only grown by around 1.26 percent per year (Statistics Indonesia 2001), then to be able to meet the needs of corn consumption in the next 10 years through efforts to increase the planted area, it is likely to face quite a challenge. .

As with rice production, maize production in North Sumatra has also decreased. In 2005 the amount of corn production in North Sumatra was 735,456 tons, while in 2006 it was 682,046 tons and increased again in 2007 by 804,850. Districts/cities that became the mainstay of corn production in North Sumatra in 2007 were Simalungun Regency with 204,196 tons with a harvested area of 59,604Ha, while Karo Regency with 171,010 tons with a harvested area of 50,286Ha.

The condition of food security can be seen from the production each year which is influenced by the factor of harvested area. Land or land is the most important asset for agricultural activities, unfortunately, the government is negligent in this regard. Land ownership as the most important pillar of production activities is increasingly unfriendly to the needs of the agricultural sector[19]. According to BPS and BPN (National Land Agency), every five years the conversion of agricultural land for other uses (industry, services, settlements) reaches 106 thousand hectares. The accumulation of these problems causes the production of agricultural commodities to decline. Worse yet, the infrastructure used to distribute agricultural products is far from adequate. In addition, land resources as the basis for activities in the agricultural sector are increasingly being pressured by other economic activities, including housing and transportation infrastructure, resulting in a decrease in food production, thereby encouraging increased imports of various commodities. Conversion of land into residential, industrial, road infrastructure and other sectors is likely to continue[20], [21].

Human resources are one of the most strategic factors of production. Its role is different from other factors of production, where human resources will increase their ability to manage, combine and utilize various factors of production.[22]. Labor is the main element in the process of producing goods and services as well as regulating production facilities and infrastructure to produce goods and services, where labor is another means of production such as raw materials, land, water, etc. resources to produce goods. Therefore, labor is still decisive in increasing food production because the contribution of labor is considered to determine the performance of farming which is still labor intensive[23].

However, in practice, achieving the increase in production is not easy, because these two things are not enough to increase production. Equally important is sufficient capital as a guarantee of productivity and smoothness in increasing food production. Where is often a problem in increasing production is a problem of capital. This capital is highly expected by farmers because many of them want to increase production but do not have adequate funds. To overcome this, the government through other financial institutions as a place to receive loan funds as capital in this case for farmers[24]. This is in the form of a loan or nowadays it is called a credit. Where is the credit facility, in this case agricultural credit, which is used to cover working capital needs in order to finance its business activities. Therefore, in economic development, in this case increasing production, the role of credit allocation in financing agricultural production is very necessary.

2. RESEARCH METHODS

The research method is the steps and procedures that will be carried out in collecting data or information in solving problems and testing research hypotheses. The research methods carried out are as follows:

2.1 The scope of research

The scope of this research is to observe and analyze the effect of harvested area, agricultural credit, labor that affect the increase in food production (rice and corn) in North Sumatra.

2.2 Types and Sources of Data

The type of data used in this study is secondary data in the form of quantitative time series, namely data in the form of numbers. The source of the data is obtained through reports from the Central Statistics Agency (BPS) of North Sumatra Province in the period 1988 to 2007 as well as library materials in the form of readings related to research, websites and journals.

2.3 Data Collection Methods And Techniques

For data collection, the author uses secondary data collection methods obtained from related agencies by using data and information collection methods through the study of various relevant literature obtained from official publications related to the problems that exist in research writing which can be obtained from books, books, magazines, newspapers, brochures, internet and others. The data collection technique used is using direct recording obtained from various sources mentioned above in accordance with the data used. The author uses a computer program e-views 4.1 to process data in writing this thesis.

3. RESULTS AND DISCUSSION

3.1 Agricultural Development

Within the framework of national development, the main mandate of the agricultural sector is to provide sufficient food for the population and support the development of other sectors. In the future, the mandate will feel even more difficult because the demand for agricultural products continues to increase in line with the rate of population growth and improvement in per capita income. Demand for agricultural products will increase in quantity, variety, and quality.

Growing agriculture has a very important role in economic development. History shows that agricultural development is a prerequisite for progress in the next stages of development. Because agriculture is related to various aspects of the economy, agricultural development is the main determinant of rural economic growth. Agriculture is a sector that has a very important role in the economy. The roles of agriculture include:

- a) Provision of sufficient food for the population
- b) Encouraging economic growth through the provision of raw materials for industry and exports.
- c) Increasing the distribution of farmer welfare through the provision of employment and business opportunities
- d) Contribute to regional economic development

The main mission of the agricultural sector is to produce sufficient and quality food for the entire population at a reasonable price. With the achievement of this mission, agriculture will certainly make a major contribution to the trilogy of development, namely stability, growth and equity.

3.2 Challenges in increasing food production

Efforts to increase food production often face several internal weaknesses, including low quality human resources, lack of mastery of science, declining fertility of agricultural land, very less agricultural capital and if available is very limited, the marketing system does not guarantee proper incentives. for farmers, agricultural management between the center and the regions has not been coordinated and national policy priorities have not been in favor of agriculture,

The lagging behind in the agricultural sector has resulted in economic development and state development in general not having a solid foundation and being prone to collapse when circumstances change. The real negative impacts of the decline in agriculture are: (1) increasing poverty rates, (2) low food security, (3) high dependence on foreign food, (4) industrialization that occurs is highly dependent on production factors or imported raw materials, (5) unemployment in rural areas is high, (6) quality of life in rural areas declines, (7) the quality of the environment and natural resources declines, and (8) the ability or competitiveness of the nation and state is low. All of this can be prevented if the government gives great priority and attention to agricultural and rural development in each region.

3.3 Rice and corn production

The ability to increase domestic rice production is increasingly demanded to balance the increasing demand, in line with the increasing population with high consumption levels. For the people of Indonesia, especially for the province of North Sumatra, rice concerns the interests of the wider community which in an effort to meet needs must be handled seriously by the government. Rice is an important and strategic commodity for the province of North Sumatra because it is a staple food and a source of carbohydrates for the population. Food diversification efforts do not seem to be able to change the

population's preference for rice. Considering the strategic role of rice, the government has set a target of sufficient supply of domestic production of at least 95% of the demand or in the term self-sufficiency on trend.

The increase in food production in North Sumatra, especially rice production in producing rice production, is not as fast as the increase in population. As a result, there is an imbalance between the demand for rice and the availability of rice which will result in an increase and dependence on rice imports. The development of harvested area and production in North Sumatra experienced ups and downs where in 2005, the amount of rice production decreased from 3,447,379 tons to 3,007,686 tons in 2006, and increased again in 2007 by 3,265,834 tons. If this continues, it is feared that food insecurity will occur given the increase in population every year, considering that rice is a food habit of Indonesian people.

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Table 1. Total Production of North Sumatran Rice and Corn (Tons)

Year	Production Rice (Tons)	Production corn (Tons)
1988	2,318,139	167,277
1989	2,369,841	175,991
1990	2,478,460	187,799
1991	2,584,678	222.162
1992	2,715,280	262.412
1993	2,750,463	271.298
1994	2,904,484	311,918
1995	2,964,280	371,578
1996	2,966,681	398,708
1997	3,037,618	459,715
1998	3,144,544	509,809
1999	3,295,079	718,706
2000	3,323.811	688,460
2001	3.110,615	634,162
2002	2,981,889	640,593
2003	3,195,515	687,360
2004	3,214,782	712,560
2005	3,240,209	735,456
2006	2,870,944	682.046
2007	3,107,570	804.850

3.4 Harvest Area

On the one hand the land cultivated per farmer is getting narrower, on the other hand the quality of the land is also getting lower. The quality and productivity of land cultivated by farmers is also increasingly difficult to improve. Overexploitation of land ultimately has a real impact on declining land productivity.

Therefore, efforts to control the conversion of productive land are needed so that productive agricultural areas can be maintained in the long term. In this regard, there are two approaches that can be taken to control the conversion process, namely the institutional approach and or the economic approach. The institutional approach can be done by issuing a prohibition on land conversion for certain types of land, while the economy is pursued by providing incentives to farmers not to sell their land for conversion by investors. In line with what was stated by Sudaryanto (2001), in responding to the increasingly widespread conversion of paddy fields and fields, the government has anticipated it with various steps, both in anticipation of decreasing rice production and preventing the spread of land conversion.

Table 2.Area of North Sumatra Rice and Corn (Ha)

Year	Land area rice (Ha)	Land area corn (Ha)
1988	672.885	82,760
1989	679,423	86,818
1990	681,798	88,099
1991	713.060	93.772
1992	752.636	115,974
1993	754.569	122.039
1994	792,534	140,941
1995	795,183	165,230
1996	790.051	174,000
1997	795,011	198,246
1998	823,709	183.332
1999	847.003	199,355
2000	847,610	221,906
2001	801,948	198,709
2002	765,161	198,670
2003	825,188	210,782
2004	826,091	214.885
2005	822.073	218,569
2006	705.023	200.146
2007	750.232	229,882

3.5 North Sumatran Manpower Development

The number of North Sumatran workers every year tends to increase in 2004 there were 7,997,002, then increased again to 8,067,608 in 2005 and became 8,208,651 in 2006. The growth rate in 2006 was 1.75%, up from the previous year which was only 0.08%.

Table 3.Number of population aged 15 years and over by type of activity

Type of activity	2005	2006	2007
1. Force	5,803.112	5,491,696	5,654,131
Working	5.166,132	4,859,647	5,082,797

Searching job	636,980	632.049	571,334
2. Not the Labor Force	2,263,896	2.176..955	2,724,017
3. Labor (1+2)	8,067.008	8,208,651	8,378,148

Based on the percentage of the population aged 15 years and over who work by business field, in 2006 the agricultural sector dominated with 49.64% followed by the trade and service sector with a percentage of 19.21 and 11.81 respectively, while the lowest contributor was the electricity sector. gas and water which is only 0.033%. The high percentage of the population of North Sumatra who work in the agricultural sector shows that the level of community dependence on the agricultural sector is a leader in providing employment.

Based on the results of the author's research on several rice farmers and corn farmers in general, farmers use 1 person/1000 meters of labor in managing the agricultural land, whether it is hoeing, planting, weeding, or at harvest time.

3.6 The role of agricultural credit

Based on developments in the number of loans disbursed to the agricultural sector, the number continued to increase, namely in 2007 amounting to Rp. 8,290,967,000,000 which when compared to the industrial sector the amount was still smaller where the number of loans disbursed to the industrial sector was Rp. 15,128,547,000,000. . The amount of capital spent by rice farmers in producing rice plants can generally be seen in the table below:

Table 4. The amount of costs needed by farmers in producing rice in 1,000 meters of land area.

No	Description of activities	physique	Value (Rp)
Labor Use			
1	Land Preparation (Land processing)	Tractor/1,000M	160,000
2	Maintenance Planting		
	- Planting	1org/1,000M	90,000
	- Weeding	1org/1,000M	40,000
	- Harvest	1org/1,000M	120,000
	Amount	-	410,000
Use of Facilities Production			
3	Seeds	2Kg/1,000M	8.000
4	Fertilizer		
	- Urea	20 Kg/1,000M	30,000
	-sp	10Kg/1,000M	40,000
	-Kcl	10Kg/1,000M	45,000
	Amount		123,000
	Total cost		533,000

Table 5. The amount of costs needed by farmers in producing corn in 1,000 meters of land area.

No	Description of activities	physique	Value (Rp)
Labor Use			
1	Land Preparation (Land processing)	Tractor/1,000M	60,000

2	Maintenance Planting		
	- Planting	1org/1,000M	50,000
	- Weeding	1org/1,000M	40,000
	- Harvest	1org/1,000M	60,000
	Amount	-	210,000
Use of Production Facilities			
3	Seeds	1.5Kg/1,000M	48,000
4	Fertilizer		
	- Urea	20 Kg/1,000M	30,000
	-Phonska	10Kg/1,000M	36,000
	-sp	10Kg/1,000M	40,000
	Amount		144,000
	Total cost		354,000

3.7 Rice Production Analysis Results

In this section, we will look at the factors that influence food production in North Sumatra, namely land area, agricultural credit, and labor. The analysis of this discussion is intended to determine the correlation between the two variables, namely the dependent variable (production) and the independent variable (land area, agricultural credit and labor). To test the above hypothesis, multiple linear regression analysis was used with the OLS (Ordinary Least Square) analysis technique. The calculation process is carried out using the Eviews computer program while the regression results obtained are as follows:

Table 6. Results of Regression Analysis of Food Production (Rice Production)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Large	0.675572	0.502023	1.345701	0.1972
Credit	0.000233	0.000146	1.596570	0.1299
Labor	0.029036	0.012371	2.347097	0.0321
C	4.611791	6.348513	0.726436	0.4781
R-squared	0.750440	Mean dependent var		14.84601
Adjusted R-squared	0.703648	SD dependent var		0.155107
SE of regression	0.084437	Akaike info criterion		-1.928756
Sum squared resid	0.114075	Schwarz criterion		-1.729610
Likelihood logs	23.28756	F-statistics		16.03765
Durbin-Watson stat	1.527191	Prob(F-statistic)		0.000044

Dependent Variable: LPS Method: Least Squares

Date: 04/07/09 Time: 10:05

Sample: 1988 2007

Included observations: 20

3.8 Corn Production Analysis Results

In this section, we will look at the factors that affect food production (corn production) in North Sumatra, namely land area, agricultural credit, and labor. The analysis of this discussion is intended to determine the correlation between the two variables, namely the dependent variable (corn production) and the independent variable (corn area, corn agricultural credit and corn farmer labor). To test the above hypothesis, multiple linear regression analysis was used with the OLS (Ordinary Least Square) analysis technique. The calculation process is carried out using the Eviews computer program while the regression results obtained are as follows:

Table 7.Results of Regression Analysis of Corn Production Determinants

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Large	0.293011	0.024066	12.17508	0.0000
Credit	1.160013	4.839014	2.392049	0.0294
Labor	-0.002983	0.005072	-0.588181	0.5646
C	18.30555	0.272616	67.14778	0.0000
R-squared	0.923287	Mean dependent var		21.79353
Adjusted R-squared	0.908903	SD dependent var		0.109165
SE of regression	0.032948	Akaike info criterion		-3.810889
Sum squared resid	0.017370	Schwarz criterion		-3.611743
Likelihood logs	42.10889	F-statistics		64.18950
Durbin-Watson stat	1.774968	Prob(F-statistic)		0.000000

Dependent Variable: Production

Method: Least Squares

Date: 04/01/09 Time: 11:16

Sample: 1988 2007

Included observations: 20

4. Conclusion

Based on the results of research on the effect of harvested area, agricultural credit and labor on food production (rice and corn), the authors can draw some conclusions here, namely: Rice harvested area has a positive influence on food production (rice production) in Indonesia. North Sumatra. This can be seen or shown by the coefficient of rice harvested area, which is 0.675. This means that for every 1% increase in harvested area, food production (rice production) will increase by 0.675%, *ceteris paribus*. Rice agricultural credit has a positive influence on food production (rice production) in North Sumatra. This can be seen or shown by the rice agricultural credit coefficient, which is 0.0023. This means that for every 1% increase in rice agricultural credit, food production (rice production) will increase by 0.0023%, *ceteris paribus*. The labor of rice farmers has a positive relationship to food production (rice production) in North Sumatra. This can be seen or shown by the labor coefficient of rice farmers, which is 0.029. This means that for every 1% increase in the workforce of rice farmers, food production (rice production) will increase by 0.029%, *ceteris paribus*. Corn harvested area has a positive influence on food production (corn production) in North Sumatra. This can be seen or shown by the coefficient of harvested area of 0.293011. This means that for every 1% increase in corn harvested area, food production (corn production) will increase by 0.29%, *ceteris paribus*. Corn agricultural credit has a positive influence on food production (corn production) in North Sumatra. This can be seen or shown by the corn agricultural credit coefficient, which is 1.160013. This means that for every 1% increase in corn agricultural credit, food production (corn production) will increase by 1.16%, *ceteris paribus*. Maize farming labor has a negative relationship to food production (corn production) in North Sumatra. This can be seen or indicated by the labor coefficient of corn farmers, which is -0.002983. This means that every increase in labor for corn farmers without being followed by an increase in land area and an increase in labor productivity by 1%, food production (corn production) will decrease by -0.002%, *ceteris paribus*. This means that for every 1% increase in corn agricultural credit, food production (corn production) will increase by 1.16%, *ceteris paribus*. Maize farming labor has a negative relationship to food production (corn production) in North Sumatra. This can be seen or indicated by the labor coefficient of corn farmers, which is -0.002983. This means that every increase in labor for corn farmers without being followed by

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