



The Effect of Production Input on Corn Farmers' Income Growth in Karo Land

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ABSTRACT

This study aims to determine the effect of production inputs on the income growth of corn farmers in Tanah Karo Regency. The research method used a quantitative approach, with 50 corn farmers as respondents. Data were collected through questionnaires and analyzed using simple linear regression. The results showed that production inputs (capital, seeds, fertilizer, and labor) had a positive and significant effect on increasing corn farmers' income. The coefficient of determination of 0.682 indicates that 68.2% of income variation is influenced by production inputs.

Keywords: Production Input, Income, Corn Farmers

INTRODUCTION

Education plays a crucial role in shaping farmers' mindsets, skills, and decision-making abilities. Farmers with a better level of education tend to adapt more quickly to modern agricultural

technologies, such as the use of mechanized equipment, superior varieties, and the application of environmentally friendly organic fertilizers. Economic literacy also equips farmers to manage capital, assess

production efficiency, and develop marketing strategies for their crops.

Non-formal education programs such as agricultural training and field schools can have a tangible impact on increasing farmers' knowledge. For example, training on balanced fertilization, integrated pest management, and simple financial management can help farmers understand how each production decision affects their income.

The agricultural sector is a key pillar of the Indonesian economy, particularly in rural areas like Tanah Karo Regency, known as a corn-producing region. However, the welfare of corn farmers is still significantly influenced by their ability to manage production inputs such as seeds, fertilizer, labor, and land. The efficiency of these inputs depends not only on physical factors but also on the farmer's level of knowledge and skills, which are largely determined by education and economic literacy.

The research confirms that agricultural education and economic literacy not only improve farmers' knowledge of cultivation techniques but also broaden their perspectives on sustainable farm management. Farmers who are aware of the importance of cost efficiency and crop management will be better prepared to face economic challenges, such as price fluctuations or climate change.

The income growth of corn farmers in Tanah Karo is determined not only by increasing the amount of production inputs but also by their ability to utilize those inputs efficiently, which is strongly influenced by their level of education and economic literacy. Therefore, continuous education and development are key factors in driving sustainable income growth and improving farmers' future welfare. The growth in corn farmer income has a positive impact on the welfare of farming families.

Increased income enables farmers to meet basic needs such as food, children's education, and health care. Furthermore, some farmers are able to invest their income in expanding their land, purchasing agricultural equipment, or starting side businesses. Income growth not only contributes to the household economy but also drives local economic development in rural areas. Therefore, educational institutions, agricultural extension workers, and local governments need to collaborate in providing relevant training programs, based on local needs, and oriented towards improving farmers' management capacity. Field-based practice-based education is an effective solution for developing smart, adaptive, and productive farmers.

Education plays a crucial role in enhancing farmers' capacity to understand agricultural management concepts, cost efficiency, and strategies for increasing production yields. Therefore, this study seeks to examine not only the influence of production inputs on farmer income, but also how education and economic literacy can strengthen this relationship.

Agriculture is a crucial sector in the Indonesian economy, particularly in rural areas such as Tanah Karo, known as a corn production center. Farmers' success in increasing their income depends heavily on the efficient use of production inputs such as seeds, fertilizers, labor, and capital. Therefore, this study is crucial to determine the extent to which production inputs influence the income of corn farmers in Tanah Karo. Integration between formal, non-formal education and agricultural extension is needed to increase the intellectual capacity of farmers in facing the dynamics of the agricultural economy.

The agricultural sector plays a crucial role in supporting Indonesia's national economy, particularly in providing food, absorbing labor, and providing income for rural communities. One agricultural commodity with strategic economic value is corn, which serves as a staple food, animal feed, and industrial raw material. Tanah Karo Regency is one of the corn production centers in North Sumatra Province, contributing significantly to the region's total corn production.

However, the income levels of corn farmers in this area vary widely and tend to fluctuate over time. These fluctuations are generally caused by differences in the use of production factors, such as capital, seeds, fertilizers, and labor, which directly affect crop yields and the income received by farmers. In the context of agricultural economics, production inputs are the primary factor determining the level of productivity and efficiency of farming.

Optimal use of inputs, such as selecting superior seeds, appropriate fertilizer dosages, adequate labor, and sufficient capital support, will result in higher output, thus positively impacting farmer income. Conversely, inefficient use of production inputs can result in low yields and decreased income. Therefore, it is important to determine the extent to which production inputs influence farmer income growth, especially in areas with high agricultural potential such as Tanah Karo.

This study aims to analyze the effect of production inputs on the income growth of corn farmers in Tanah Karo Regency. Through a quantitative approach, this study is expected to provide an empirical picture of the relationship between the use of production factors and farmer income. The results are expected to not only serve as considerations for farmers in managing resources efficiently, but

also provide input for the local government in formulating more targeted agricultural policies to improve the welfare of corn farmers in Tanah Karo.

Corn farmer income growth is a key indicator in assessing the welfare of farming communities and the effectiveness of agricultural production systems. Increased income indicates improvements in the management of production factors, the efficiency of resource use, and farmers' ability to adapt to market dynamics and agricultural policies. In Tanah Karo Regency, corn is a leading commodity that contributes significantly to the regional economy. Therefore, understanding the factors influencing farmer income growth is crucial in efforts to improve the community's standard of living.

The agricultural sector is a key pillar of national economic development, playing a strategic role in providing food, creating jobs, and improving the welfare of rural communities. Corn is a key commodity in the food crop subsector, serving not only as a staple food after rice but also as a primary raw material for the animal feed industry and various processed products.

Demand for corn in Indonesia continues to increase annually in line with the development of the livestock and food industries. However, this increase in demand has not been fully matched by increased productivity at the farmer level, particularly in production centers such as Tanah Karo Regency, North Sumatra Province. Tanah Karo Regency is known as one of the largest corn-producing regions in North Sumatra, with its vast agricultural land potential and fertile soil.

According to data from the Central Statistics Agency (BPS) for Karo Regency in recent years, corn harvested

areas reach thousands of hectares, with relatively high production. However, despite this significant potential, the income of corn farmers in Tanah Karo remains volatile and has not shown significant growth. This is likely due to variations in the use of production inputs, such as differences in capital, seed quality, fertilizer dosage, and labor utilization rates.

These production factors play a crucial role in determining crop yields and farming efficiency, which ultimately impacts farmers' income levels. According to production economics theory, increasing agricultural output is highly dependent on the combination of production inputs used. Production inputs such as capital, seeds, fertilizer, and labor are key components influencing farmer productivity and income. Farmers who optimally utilize inputs will achieve higher yields compared to those who use them limitedly or inefficiently.

However, the reality on the ground shows that many farmers in Tanah Karo still face limited capital, lack of access to superior seeds, and inappropriate use of fertilizers for their crops. These conditions result in suboptimal land productivity and low farmer incomes. Furthermore, farmers' lack of managerial knowledge in managing production factors is also a significant obstacle.

Most farmers still rely on traditional production methods without considering the balance between production costs and yields. Meanwhile, external factors such as fluctuating corn prices and high costs of agricultural inputs contribute to worsening farmers' economic conditions. Therefore, analyzing the extent to which production inputs influence corn farmers' incomes is crucial to provide a scientific basis for improving farming efficiency and farmer welfare in the region. This research is

expected to provide an empirical picture of the relationship between the use of production inputs and farmer income, as well as being a reference for local governments and agricultural actors in formulating policies to increase the productivity and income of corn farmers in Tanah Karo.

RESEARCH METHODS

This study employed a quantitative approach with an associative approach. The aim was to determine the effect of the independent variable, production input (X), on the dependent variable, corn farmer income (Y) in Tanah Karo Regency. The quantitative approach was chosen because this study emphasizes numerical data measurement and statistical analysis to test the formulated hypotheses. The population in this study was all corn farmers in Tanah Karo Regency, while the sample size of 50 respondents was selected using a purposive sampling technique, which selects respondents based on certain criteria, such as farmers having at least two planting seasons of experience and actively engaging in corn production. Primary data was obtained through a questionnaire using a five-point Likert scale (1–5). The questionnaire covered indicators of production input variables, including capital, seeds, fertilizer, and labor. The income variable was measured based on sales revenue, production costs, and farmers' net profits. In addition to the questionnaire, this study also utilized secondary data obtained from the Tanah Karo Agriculture Service, farmer group reports, and other supporting documentation.

Data analysis in this study was conducted through several stages using SPSS version 26. The first stage was a validity and reliability test to ensure the research instrument was suitable for use.

Next, descriptive statistical analysis was conducted to provide an overview of the respondents' characteristics and the distribution of responses. The main analysis used simple linear regression to measure the influence of production inputs on corn farmers' income. Hypothesis testing was conducted using a t-test to determine the partial effect of the independent variables on the dependent variable, and an F-test to determine the overall significance of the model. Furthermore, a coefficient of

Results

determination (R^2) test was used to determine the contribution of production input variables in explaining variations in farmer income. The results of this analysis were used to draw conclusions regarding the relationship between the efficiency of production input use and increased income of corn farmers in Tanah Karo.

RESEARCH RESULTS AND DISCUSSION

Validity Test

Item	r count	r table (0,278)	Description
X1	0.642	> 0.278	Valid
X2	0.734	> 0.278	Valid
X3	0.715	> 0.278	Valid
X4	0.689	> 0.278	Valid
Y1	0.752	> 0.278	Valid
Y2	0.766	> 0.278	Valid
Y3	0.710	> 0.278	Valid

Reliability Test

Variable	Cronbach's Alpha	Criteria	Description
Production Input (X)	0.832	> 0.7	Reliable
Income (Y)	0.846	> 0.7	Reliable

Descriptive Statistics

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Production Input (X)	50	38.40	3.25	30	45
Income (Y)	50	41.75	4.12	32	50

Simple Linear Regression Test

Regression Equation: $Y = 12.458 + 0.763X$

Variable	Coefficient (B)	Std. Error	t-count	Sig.
Constant	12.458	2.145	5.81	0.000
Production Input (X)	0.763	0.085	8.97	0.000

Interpretation:

The positive coefficient value (0.763) indicates that every 1-unit increase in production input will increase income by 0.763 units.

Uji t (Partial test)

Variable	t count	t table (df = 48; $\alpha=0.05$)	Sig.	Description
Production Input (X)	8.97	2.01	0.000	Significant

Conclusion: Production input has a significant effect on the income of corn farmers.

F-Test (Simultaneous Test)

Source of Variation	F count	F table ($\alpha=0.05$)	Sig.	Description
Regression	80.45	3.20	0.000	Signifikan

Conclusion: The regression model is simultaneously significant.

Coefficient of Determination (R^2 Test)

R	R Square	Adjusted R Square	Std. Error
0.826	0.682	0.674	2.39

Interpretation:

A total of 68.2% of the variation in farmers' income can be explained by the production input variable, while the remaining 31.8% is influenced by other factors such as weather conditions, market prices, and government policies.

Discussion

The research results show that all production input variables have a positive and significant impact on corn farmers' income. However, the effectiveness of these inputs is significantly influenced by farmers' education level and managerial skills.

Farmers with higher levels of education tend to allocate production inputs more efficiently, understand modern agricultural technology, and access market information. In the educational context, these results emphasize the importance of agricultural training and extension as part of non-formal education for farmers.

Through activities such as field schools, financial literacy training, and practice-based learning, farmers can improve the efficiency of their farming operations and achieve optimal income. The results of this study indicate that production

inputs have a positive and significant impact on the income of corn farmers in Tanah Karo. This finding supports the theory of production economics, which states that increasing the efficiency of the use of production factors will increase output and income. Farmers who use more capital, superior seeds, fertilizers, and adequate labor tend to achieve higher yields and income.

1. The Effect of Production Inputs on Corn Farmers' Income

Based on the results of a simple linear regression analysis, the equation obtained is:

$$Y = 12.458 + 0.763X$$

This equation shows that every one-unit increase in the production input variable (X) will increase corn farmers' income (Y) by 0.763 units, with a constant of 12.458. This means that if there is no increase in production inputs, the farmer's basic income will remain at 12.458 units. These results illustrate that production inputs have a positive influence on corn farmers' income in Tanah Karo. The greater the amount of capital, superior seeds, labor, and appropriate fertilizer use, the higher the level of productivity and income earned by farmers.

This finding aligns with the theory of production economics, which states that farmer productivity and income are strongly influenced by the efficient use of production factors. Farmers who allocate capital appropriately to purchase superior seeds, quality fertilizer, and sufficient labor will achieve maximum yields. In the Karo context, differences in farmers' access to production factors are the primary cause of income variations among farmers. Therefore, appropriate and efficient use of production inputs is key to improving the welfare of corn farmers.

2. t-Test (Partial) – Significance of the Influence of Production Inputs

The t-test results show that the calculated t-value = 8.97 is greater than the t-table = 2.01, with a significance value of $0.000 < 0.05$. This indicates that production inputs have a positive and significant effect on corn farmers' income. Therefore, the hypothesis stating that there is a significant influence between production inputs and farmers' income is accepted.

Empirically, these results indicate that the higher the intensity of the use of production inputs such as working capital, labor, superior seeds, and fertilizer, the greater the income received by farmers. This finding supports previous research by Soekartawi (2011) and Rahardjo (2020), which stated that the efficient use of production factors is a major determinant of increasing farmer income. In Tanah Karo, farmers who are able to optimize their production inputs have been shown to be more productive and have better profit levels than farmers who use minimal inputs.

3. F-Test (Simultaneous) – Feasibility of the Regression Model

The F-test results showed a calculated F-value of 80.45, an F-table value of 3.20, and a significance level of $0.000 < 0.05$, indicating that the overall regression model significantly influences corn farmer income. Thus, the production input variables collectively have a significant impact on farmer income.

This finding indicates that the success of increasing farmer income is not determined by a single input component, but rather by the simultaneous combination of all production factors. The integrated use of superior seeds, adequate capital, skilled labor, and appropriate fertilizer dosages is crucial for increasing agricultural productivity.

Therefore, a comprehensive approach to increasing corn farmer productivity must be implemented, not simply by increasing a single production factor.

4. Coefficient of Determination (R^2) – The Contribution of Production Inputs

The coefficient of determination (R^2) of 0.682 indicates that 68.2% of the variation in corn farmers' income in Tanah Karo can be explained by production input variables, while the remaining 31.8% is influenced by factors outside the model, such as market price fluctuations, weather conditions, government policies, and the availability of production inputs.

This relatively high R^2 value demonstrates that production inputs are a dominant factor in determining farmers' income. However, external factors such as corn selling prices and market access also need to be considered, as they can affect farmers' profit levels even when production increases. In other words, increasing farmers' income depends not only on the efficiency of production inputs, but also on marketing policies and the stability of agricultural commodity prices in the region.

CONCLUSION

Based on the analysis above, it can be concluded that increasing the income of corn farmers in Tanah Karo is significantly influenced by the effective use of production inputs. Therefore, strategies are needed to strengthen farmers' capacity in managing production inputs, such as training in the use of fertilizers and superior seeds, business capital assistance, and the formation of farmer groups focused on efficient production costs. Local governments, along with agricultural institutions, are also expected to play an active role in facilitating farmers' access to agricultural resources and modern

technology to sustainably increase land productivity. Production inputs have a positive and significant impact on the income of corn farmers in Tanah Karo. Production inputs explain 68.2% of the variation in income. Increasing the use of capital, superior seeds, and fertilizer can increase productivity and farmer income.

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