

ECONOMIC POTENTIAL OF MAIZE (ZEA MAYS L) FARMING IN KOTA BAHAGIA SUB-DISTRICT, SOUTH ACEH DISTRICT

Qhishthina Atikah¹, Bagio^{2*}, Nurlaili², Safrika², Abdul Muzammil²

¹⁾ Department of Agribusiness, Faculty of Agriculture, Universitas Syiah Kuala, Aceh, Indonesia

²⁾ Department of Agribusiness, Faculty of Agriculture, Universitas Teuku Umar, Aceh, Indonesia

Correspondence E-mail: ¹⁾ qhishthina.atikah@usk.ac.id, ²⁾ bagio@utu.ac.id, ²⁾ nurlaili06021999@gmail.com,
²⁾ safrika@utu.ac.id, ²⁾ abdulmuzammil@utu.ac.id

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Abstract

The government prioritizes increasing the production of rice and maize as staples and raw materials for the animal feed industry. Maize (Zea Mays L.), the second major source of carbohydrates after rice, continues to increase in use as food and animal feed in Indonesia. Increased maize production is needed through land expansion and increased productivity to meet growing market demand. The research was conducted in Kota Bahagia Subdistrict, South Aceh District, the research began in August to September 2023 with a population of 1,450 farmers, with a sample of 94 corn farmers in Kota Bahagia Subdistrict, South Aceh. The results showed that the average income of maize farmers was IDR 17,758,435.36 per growing season, which is above the local poverty line. Revenue Cost Ratio (R/C Ratio) and Return on Investment (ROI) analysis amounted to 2.36 and 135.60%, respectively, indicating efficient use of capital and significant profits. The Break Even Point (BEP) of production and selling price of 3,274.08 kg per period and IDR 1,697.80 per kg indicate that the farm is profitable.

Keywords: *Maize Farming, Income, Revenue Cost Ratio (R/C Ratio) and Return on Investment (ROI).*

1. INTRODUCTION

The government prioritizes increasing the production of rice and maize because they are both staple foods and raw materials for the animal feed and food industries. Rice and maize are still imported, so it is important to know their demand and production levels to prevent surpluses or shortages that could harm consumers and producers. Maize (Zea Mays L.) is the second most important source of carbohydrates in Indonesia after rice and its use as food and animal feed is increasing.

Maize marketing potential also continues to grow, so there is a need to increase production through land expansion and increased productivity. Aceh Province has abundant natural resources, one of which is agribusiness potential that can improve the welfare of the community. Maize is a popular commodity in Aceh and the Maize Agribusiness Development Program aims to accelerate the development of superior commodities in the Aceh Selatan region, increase community income, and encourage rural economic growth. Maize also plays a significant role in the national economy thanks to the food industry supported by cultivation technology and superior varieties.

Kota Bahagia sub-district in South Aceh district is one of the areas with the largest maize production, reaching 1290.60 tons with a harvest area of 215.00 ha and productivity of 6.00 tons/ha [1]. Residents of Kota Bahagia subdistrict rely on the agricultural sector, especially maize and rice, to fulfill their family needs. However, maize productivity and quality are still low due to the lack of technology application and limited capital. Maize farmers are faced with various obstacles in cultivation, such as lack of organization in farmer groups, limited harvesting tools and machinery,

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and low knowledge of agricultural technology. In addition, price instability aggravates their situation. This results in a negative impact on the income and welfare of farming families.

2. LITERATURE REVIEW

Corn plants (zea mays L.) are grasses and single-seeded plants (monocots). Corn is a strong grass plant, slightly clumped with rough stems and its height ranges from 0.6-3 m. corn plants are included in the type of seasonal plants with an age of ± 3 months [2]. According to [3], farming is a science that studies how a farmer coordinates and organizes production factors as efficiently as possible so that later it can provide benefits for farmers. Farmers who make farming as their main source of income must be able to manage their farms properly and efficiently in order to get outputs and profits that can support the sustainability of their farms in the future, and can also be a source of livelihood for farming families.

Farming is a human business activity to cultivate the land with the intention of obtaining plant or animal products without reducing the ability of the land concerned to obtain further results. Farming as an organization of nature, work and capital aimed at production in the agricultural sector [4]. According to [5] cost is the amount of money spent by producers or entrepreneurs to finance production activities. Costs are classified into fixed costs and variable costs.

Farm income is the multiplication of production obtained by the selling price. Farming costs are all expenses used in a farm and farm income is the difference between expenses and income in farming. Income is strongly influenced by the amount of production sold by the farmers themselves so that the more the amount of production, the higher the income earned [6]. [7] also mentioned that the analysis of farm income has uses for owners of production factors where there are two main objectives of income analysis, namely (1) describing the current state of a farming activity, and (2) describing the future state of a farming activity. Farm income analysis itself is very useful for farmers to measure the success rate of their farms.

3. IMPLEMENTATION METHOD

This research will be conducted in Kota Bahagia Sub-district, South Aceh District. The reason why the researcher chose this research site is because Kota Bahagia District is the third largest producer of maize. This research was conducted by purposive sampling, and was conducted from August to September 2023. This study involved 1,450 maize farmers in Kota Bahagia Subdistrict, with the sample taken randomly using the Slovin formula, with 94 maize farmers. According to [8] that the sampling technique uses the Slovin Formula if the population is known. The formula is as follows:

$$n = \frac{\pi}{1 + Ne^2}$$

Description

n = Sample size of maize farmers

N = Total population is the number of corn farmers scattered throughout Kota Bahagia Subdistrict

e = Sampling error

$$n = \frac{\pi}{1 + Ne^2}$$

$$= \frac{1.450}{1 + 1.450(0,1)^2} = \frac{1.450}{1 + 1.450(0,01)} = \frac{1.450}{1 + 14,5} = \frac{1.450}{15,5} = 93,54 = 94 \text{ samples}$$

Thus the number of samples taken in this study was 94 respondents of maize farmers.

4. RESULTS AND DISCUSSION

4.1. Respondent characteristics

The characteristics of farmers used in this study include age, education, experience, number of dependents and land area cultivated by respondents, these characteristics have a close relationship with the level of income received by respondents in the production process. This is because the characteristics reflect the ability to work, productivity, mindset, planning and efforts to increase farm income. The age of the respondents is one of the factors that influence their ability to manage their farming business. The number of maize respondents by age can be seen in Table 1 as follows.

Table 1 Age of respondents Maize Farmers in Kota Bahagia Sub-district, 2023

No	Age (Year)	Number (Person)	Percentage (%)
1	< 15	0	0
2	15 – 54	76	80,85
3	> 54	18	19,15
Total		94	100,00

Source: Primary Data (processed), 2023

Table 1 shows that the age of respondents in Kota Bahagia Sub-district, South Aceh District, aged 15-54 years is the dominant age in corn farming, namely 76 people with a percentage of 80.85%. This means that the majority of respondents are productive age, where farmers have high stamina and enthusiasm, and make it easier for them to innovate and develop their farms. [9] Work activity is influenced by age, because age is related to the physical condition of workers. The younger a worker is, the more physically strong and dynamic they tend to be.

A person's mindset will be influenced by their level of education. Currently, one measure of the quality of the workforce is the level of education. Farmers are still more likely to rely on the personal experience they learned from their ancestors, which is one of the barriers to improved agricultural quality. Today, many agricultural innovations help farmers increase productivity. To know a clear picture of the education level of respondents in this study, it can be seen in Table 2 as follows.

Table 2 Education of Maize Farmers in Kota Bahagia District, 2023

No	Education Level	Number of Respondents	Percentage (%)
1	SD	67	71,27
2	SMP	12	12,76
3	SMA	11	11,70
4	D-1	1	1,06
5	S-1	3	3,19
Total		94	100%

Source: Primary Data (processed), 2023

Based on Table 2, it shows that the highest level of formal education of respondents in corn farming in Kota Bahagia Subdistrict is elementary school education as many as 67 people (71.27%) and the least level of education is D-1 which is as many as 2 people (1.06%) of the total number of respondent farmers. [10] the level of education has a significant influence on the adoption of technology and innovation that develops. Education plays an important role in determining the respondents' skills in managing their farming businesses. The higher the level of education, the faster the technology adoption process. Innovation is very influential in improving farming in terms

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of productivity. A person's experience in a job has a positive impact on increasing expertise. The longer one pursues the job, the more proficient one becomes in the field.

Table 3 Respondents' Experience in Maize Farming, 2023

No	Description	Number (Soul)	Presentse (%)
1	4 - 6	22	23,4
2	7 - 8	35	37,23
3	9 - 10	37	39,36
	Total	94	100%

Source: Primary Data (processed), 2023

Based on Table 3, it can be seen that the respondents' experience of corn farming in Kota Bahagia Subdistrict for 4-6 years was 22 people with a percentage of 23.40%, and 7-8 years was 35 people with a percentage of 37.23% and 9-10 years was 37 people with a total percentage of 39.36%. For total. In farming the most is 37 or 39.36% with a length of farming of 9 to 10 years. Farmers in Kota Bahagia Sub-district have sufficient experience in farming. Armed with this experience, farmers continue to learn and hone their skills to increase productivity. Sufficient experience in farming can support increased productivity and work effectiveness of farmers and make them more open to the adoption of new technologies and innovations [11].

Land is the main foundation in a farm, because land is a container where the production process will be poured into it. The larger the area of land cultivated, the greater the production that will be produced. The land used by respondents in Kota Bahagia Subdistrict in maize farming is their own land, and land owned by others (rent). Farmers who own their own land, 74 out of the sample, or 78.72%, are more likely to continue running their farming business because it is the only place they can work to fulfill their and their family's needs. If they do not own land, they may stop running their farming business if they experience difficulties.

Table 4 Land Area of Maize Farming Respondents in Kota Bahagia Subdistrict, 2023

o	Land Area	Number (Soul)	Presentse (%)
	<0,5 Ha	12	12,77
	0,5 - 1 Ha	82	87,23
	> 1 Ha	0	0
	Total	94	100,00

Source: Primary Data (processed), 2023

Based on Table 4, the average land area of corn farms in Kota Bahagia Subdistrict, South Aceh Regency is in the Medium category (0.5-1.0 ha). [12] explains that the area of control of an agricultural land is the most important thing in a production process and farming, the area of land managed by a farmer will affect the amount of production and the welfare they want to achieve. Maize farmers in Kota Bahagia Sub-district, South Aceh District, said that initially not many farmers were interested in doing maize business. However, as the demand for this commodity and the market price increased over time, farmers started to become interested in the business.

4.2. Analysis Farming Business

Fixed costs in this study are the cost of using tools, equipment used hoes, machetes, and hand sprayers. The depreciation of the tools used by respondent farmers is calculated with the assumption that the tools used in maize farming shrink by the same amount each year.

Table 5 Type and Depreciation Value of Maize Farmers' Tools in One Planting Season

No	Fixed cost components	Depreciation costs (Rp) per month	
		Total	Average
1	Hand spayer	64.637.239,58	687.630,20
2	Hoe	7.019.502,22	74.675,55
3	Machete	22.407.576,39	238.378,47
Total		94.064.318,19	1.000.684,22

Source: Primary data processed, 2023

Table 5 shows that the total depreciation value of the tools used in maize farming amounted to Rp. 94,064,318.19 and the average depreciation of maize farmers in one planting period is Rp. 1,000,684.22 per planting season.

As for non-fixed costs, namely the costs incurred by farmers whose size is directly affected by the size of the farming volume, the more land area that is managed automatically the greater the cost burden incurred by farmers. In this study, non-fixed costs consist of the cost of production facilities such as seeds, fertilizers, pesticides and labor costs.

Table 6 Variable Costs in Kota Bahagia Sub-district, 2023

No	Cost component Variables	Biaya variable (Rp)	
		Total	Average
1	Land rent	9.039.000,00	451.950,00
2	Seeds	156.910.000,00	1.669.255,32
3	Urea	36.360.000,00	386.808,51
4	KCL	24.722.500,00	263.005,30
5	NPK	31.500.000,00	335.106,00
6	Gremoxone	16.965.000,00	180.478,72
7	Gresnatop	22.440.000,00	238.723,40
8	Prevaton	20.880.000,00	222.127,70
9	Sacks	19.464.000,00	207.063,80
Total		338.280.500,00	3.954.518,75

Source: Primary data processed, 2023

Based on Table 6, the total non-fixed costs of corn farming amounted to Rp. 338,280,500 with an average value of non-fixed costs incurred in corn farming in Kota Bahagia Subdistrict, South Aceh District, amounting to Rp. 3,954,518.75. The biggest cost is the cost of seeds, the more land that will be planted with corn, the need for seeds will also increase. Therefore, it is necessary to be efficient in planting the corn seeds.

In addition, labor, both from family members and non-family members, shouldbe calculated based on the prevailing wage at the time of the study. However, over time, many farmers' family members are reluctant to work in the agricultural sector for various reasons, such as competition in education or choosing to work in other sectors. As a result, farmers need to hire external labor to support their farming activities.

Table 7 Labor Costs of Maize Farming in Kota Bahagia Sub-district, 2023

No	Cost component	Variable cost (Rp)	
		Total	Average
1	Planting	45.200.000	480.851,06
2	Fertilization	26.450.000	281.382,97
3	Pest spraying	7.600.000	161.702,12
4	Harvesting	48.500.000	1.031.914,89
5	Post-harvest (pipil)	54.960.000	2.718.085,10

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Total	182.710.000	4.673.936,17
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Source: Primary data processed, 2023

Post-harvest processes, especially shelling, tend to be more costly due to several key factors. Significant costs come from intensive labor requirements, both manual and machine-assisted, maintenance costs and fuel. In addition, to maintain the quality of the harvest and reduce damage, careful handling and specialized skills are required, which adds more costs. The average total costs incurred by farmers in one maize growing season can be seen in the following table.

Table 8 Average Production Costs of Maize Farming in Kota Bahagia Sub-district, 2023

No.	Cost component	Maize farming costs (IDR)	
		Total	Average
1	Fixed Cost	101.083.820,40	2.128.080,43
2	Variable Cost	338.280.500,00	7.121.694,74
3	Labor Cost	182.710.000,00	3.846.526,32
	Total	622.074.320,40	13.096.301,49

Source: primary data processed 2023

Based on Table 8, the highest costs are variable costs. This is because the need for these costs follows the land area and there is already a standard need for production facilities from corn farming.

4.3. Maize Farming Revenue

Farm income is all farm products multiplied by the selling price of production that applies in the market in one production. Production value and production are closely related and are factors that affect the income of farmers working in farming. In this study, production value is the revenue received by farmers during one growing season, while production is the physical result produced by farmers, namely corn that has been threshed from the cob in kilograms. Meanwhile, production is the amount of maize produced multiplied by the price received by farmers during the maize harvest.

Table 9 Production and Production Value in Kota Bahagia Sub-district, 2023

No	Description	Land area (Ha)	Production (Kg)	Price (Rp)	Reception (Rp)
1	Corn	56,8	366.400	4.000	1.465.540.000

Source: Primary Data Processed 2023

Based on Table 9, it shows that the total corn production in Kota Bahagia Sub-district, South Aceh District, amounted to 366,400 kg with an average selling price at the farmer level of IDR 4,000/kg, so that the value of production or farmers' income from corn farming amounted to IDR 1,445,540,000 per growing season.

4.4. Maize Farming Income

Income is defined as the difference between the amount of revenue and costs incurred. Farm income is usually referred to as net income or profit. The average net income or profit per land area of farmers who do maize cropping patterns in Kota Bahagia Sub-district, South Aceh District can be seen in the following table.

Table 10 Maize Farmers' Income in One Planting Season in Kota Bahagia District, 2023

No	Income component	Maize farming income	
		Total (Rp)	Average (Rp)
1	Farm income	1.465.600.000,00	30.854.736,84
2	Farming costs	622.074.320,40	13.096.301,48
3	Revenue	843.525.679,60	17.758.435,36

Source: Primary Data Processed 2023

Based on Table 10, it can be seen that the average income from maize farming is Rp. 17,758,435.36 per growing season. If averaged per month, each corn farmer earns an income of Rp. 4,439,608.84 per month. From the income of these farmers, it can be said that farmers who cultivate corn farming in the research area are already above the poverty line (GK) of South Aceh District. In line with the results of research [13], the average income of maize farming is Rp. 4,580,765.28 per production period. Generally, the production period lasts for three months.

The Poverty Line (GK) of Kabupaten Aceh Selatan in 2023 is IDR 446,224; that is, the minimum amount of rupiah needed to fulfill the minimum basic needs of food equivalent to 2,100 kilo calories per capita per day and non-food basic needs is IDR 446,224. If the average number of dependents is 5 people, farmers are still able to finance the needs of their households. Thus, people who have an average consumption expenditure per capita per month below the poverty line are categorized as poor [14]. Furthermore, to see the Revenue Cost Ratio (R/C Ratio) can be obtained from the comparison between business revenue and total operational costs. To find out whether or not the corn farming business per production period can be calculated using the following formula:

$$\text{R/C ratio} = \frac{\text{Total Production Value}}{\text{Total Production Cost}} = \text{R/C ratio} = \frac{\text{Rp } 30.854.736,84}{\text{Rp } 13.096.301,48} = \text{R/C ratio} = 2,36$$

The results of the R/C ratio calculation show that maize farming in Bahagia District, South Aceh Regency is profitable, indicated by the R/C ratio value greater than 1. If the R/C ratio > 1, then the business provides a decent profit. This means that every expenditure of Rp 1,- will produce a production value of Rp 2.36. This shows that maize farming in Bahagia District, South Aceh Regency is profitable.

Return Of Investment analysis is an analysis of the level of efficiency of capital use. This analysis is carried out to determine the income (profit) of the business in relation to the capital spent.

$$\text{ROI} = \frac{\text{Revenue}}{\text{Total cost}} \times 100\% = \text{ROI} = \frac{17.758.435,36}{13.096.301,48} \times 100\%$$

ROI = 135,60% / production season.

Based on the results of the study, the ROI value of corn farming in Bahagia District, South Aceh Regency reached 135.60%. This means that every Rp 100,- of capital spent generates a profit of Rp 135.60, indicating that the use of capital in this business is very efficient with a positive percentage of profit. These results prove that maize farming provides significant benefits for farmers in the region. For comparison, research [15] on hybrid maize farming of the Bisi 2 variety in Handapherang Village, Cijeungjing Subdistrict, Ciamis Regency, resulted in an ROI of 118%. Although slightly lower, this result still shows that maize farming in Cijeungjing Sub-district is also profitable, although not as much as the ROI in Bahagia Sub-district.

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Break-even point analysis is a condition that describes the results of the business obtained equal to the capital spent, which is generally at the beginning of the business.

a) BEP Based on Production Quantity

BEP based on production quantities describes the minimum production that must be produced in the production process of Maize farming in order not to experience losses.

$$\text{BEP} = \frac{\text{Total Cost}}{\text{Selling Price}} \quad \text{BEP} = \frac{13.096.301,48}{4.000}$$

$$\text{BEP} = 3.274,08 \text{ kg/ production period.}$$

The calculation shows that the BEP production amount for maize farming is 3,274.08 kg per period. This means that when the maize farm produces 3,274.08 kg per period, it will neither make a profit nor incur a loss. Meanwhile, the average production of the maize farm is 7,713.68 kg per period, indicating that the farm has passed the breakeven point.

b) BEP Based on Selling Price (Rp)

BEP based on selling price describes the lowest price of the amount of production produced. If the price offered is lower than the BEP price, the maize farm will suffer a loss. The BEP selling price is the base price to return the capital in order for the maize farm to make a profit. Therefore for maize above the BEP selling price.

$$\text{BEP} = \frac{\text{Total Cost}}{\text{Production Quantity}} = \text{BEP} = \frac{13.096.301,48}{7.713,68} = \text{BEP} = \text{Rp}.1.697,80 / \text{kg}$$

BEP based on selling price shows the minimum price of the amount of production produced. The BEP result for maize farming was IDR 1,697.80 per kg. Meanwhile, the market price at the time of the study was IDR 4,000 per kg, indicating that the maize farm had passed the break-even point. In other words, the maize farm did not experience any losses because the market price was higher than the BEP based on the selling price.

c) BEP Land Area (Rp)

The break-even point intended in this study is to calculate at what land area corn farming is not profitable and does not lose. With the following formula:

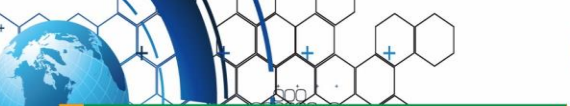
$$\text{Land Area Break-even Point} = \frac{\text{Production Volume Point}}{\text{Productivity}}$$

$$= \frac{1.697,80 \text{ Kg}}{7.713,68 \text{ Kg/ha}} = 0,22 \text{ Ha} = 2.201,03 \text{ m}^2$$

The calculation results show that the size of the land area where BEP is reached is 0.22 ha. This means that the minimum land area that must be planted is 0.22 ha or 2,201.03 m² so that farmers do not experience losses. The results show that the average cultivated land area of Maize farms in Bahagia Sub-district, South Aceh District is 0.64 ha or above the minimum land area. So the farming land area in the research area is economically profitable.

5. CONCLUSION

Based on the results of the study, the average income of maize farmers in Bahagia Sub-district, South Aceh District is IDR 17,758,435.36 per growing season or IDR 4,439,608.84 per month, which is above the poverty line of South Aceh District. Revenue Cost Ratio (R/C Ratio) analysis showed a value of 2.36, and ROI reached 135.60%, indicating efficient use of capital and significant profits. The production BEP was 3,274.08 kg per period, with an average production of



7,713.68 kg per period, and the selling price BEP was IDR 1,697.80 per kg with a market price of IDR 4,000 per kg, and the land area BEP was 0.22 ha with an average land area of 0.64 ha, proving that maize farming in Bahagia sub-district is profitable and economically efficient.

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