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FEASIBILITY ANALYSIS OF SORGUM FARMING IN GORONTALO PROVINCE

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Abstract

This study aims to: (1) determine the income earned by farmers from sorghum cultivation, and (2) assess the financial feasibility of sorghum farming in Gorontalo Province. The research was conducted from April to May 2025 and involved 20 farmers selected purposively. Data were collected through direct interviews using structured questionnaires, analyzed then quantitatively using several financial feasibility indicators, including total production cost, total revenue, net income, Gross Profit Margin (GPM), Net Profit Margin (NPM), and Revenue Cost Ratio (R/C). The results indicate that the average production cost per farmer per planting season was IDR 2,214,995, while the average revenue reached IDR 4,368,750. As a result, the average net income amounted to IDR 2,153,755. The R/C ratio of 1.9 confirms that sorghum farming is profitable, as every Rp. 1 of cost generates Rp. 1.9 of revenue. Furthermore, the GPM of 52.51% and NPM of 49.29% demonstrate a strong level of profitability. Based on these findings, sorghum farming in Gorontalo Province is considered financially viable and suitable for sustainable development.

Keywords: Sorghum, Income, Financial Feasibility, Gorontalo Province

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INTRODUCTION

The agricultural sector is one of the main pillars of the Indonesian economy. This sector consists of various subsectors such as food crops, horticulture, plantations, livestock, and fisheries. Its role is crucial in increasing people's incomes and needs to be continuously developed to increase its contribution to the economy. In recent years, the agricultural sector has continued to play a significant role in Indonesia's Gross Regional Domestic Product (GRDP), as evidenced by the increase in the number of crops grown (Habibu et al., 2022:104). Despite its significant potential, this sector still faces several challenges, such as income inequality and the weak bargaining position of farmers in the agricultural value chain (Bembok et al., 2020:334).

In this context, one food crop commodity that is beginning to receive attention is sorghum. This crop has significant potential for development, particularly in Gorontalo Province. According to data from the Central Statistics Agency (2024), sorghum production in Indonesia ranges from 4,000 to 6,000 tons per year, with the highest production in West Java, Central Java, and East Nusa Tenggara. In the past five years, sorghum production has increased from 6,114 tons to 7,695 tons (Taufany et al., 2023:7).

Sorghum is known for its resilience to extreme environmental conditions such as drought and high temperatures. It is also more water-efficient than corn and can grow on less fertile soils. This makes sorghum an adaptable crop with significant potential for cultivation in various regions, including those with fertile soil and diverse topography (Najam et al., 2021:80). However, sorghum cultivation in Indonesia, including in Gorontalo Province, remains relatively low due to its relatively new variety. This crop offers promising advantages, particularly in the face of climate change and increasingly limited land.

Low farmer interest in cultivating sorghum remains a challenge, stemming from several factors, including a lack of knowledge about the crop, limited market demand, and minimal support from local governments. Nevertheless, sorghum has significant potential for further development, particularly due to its cost-effectiveness and ability to thrive in the drylands commonly found in Gorontalo Province.

To address these challenges, strategic steps are needed, including increasing public awareness of the benefits and potential of sorghum and ensuring government policy support. Another significant challenge is the lack of standard sorghum cultivation techniques, or Good Agricultural Practices (GAP). Many farmers still use corn cultivation methods, even though these two crops

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have different agronomic requirements. Implementing appropriate cultivation techniques can increase productivity and reduce production costs (Candra et al., 2021:24).

Thus, further research and outreach are needed regarding the application of GAP to sorghum crops. Active involvement from the government and agricultural institutions in providing training and technical assistance to farmers is crucial to ensure they understand proper sorghum cultivation techniques (Agustina et al., 2017:135).

This study aims to evaluate the feasibility of sorghum cultivation in Gorontalo Province. Using a microeconomic approach, the analysis will focus on production costs, revenue, farming efficiency, and household profits (Adi et al., 2023:1770). Meanwhile, from a macroeconomic perspective, this study considers how sorghum development can support national food security, reduce dependence on cereal imports, and stimulate economic growth at the regional and national levels (National Food Agency 2021).

The results of this study can serve as a basis for formulating future sorghum agricultural development policies and strategies, which consider not only sustainability but also the overall welfare of farmers. Furthermore, this study aims to provide a deeper understanding of the opportunities and challenges in developing sorghum farming in Gorontalo Province and to formulate appropriate recommendations to support successful sorghum cultivation in the region.

LITERATURE REVIEW

Sorghum Plants

Sorghum (Sorghum bicolor L.) is not native to Indonesia, but originates from the Niger River region of Africa. This plant underwent a domestication process from Ethiopia to Egypt, estimated to have occurred around 3,000 years BC. Despite this, sorghum is well-known among farmers in Indonesia, particularly in Java, West Nusa Tenggara (NTB), and East Nusa Tenggara (NTT) (Lina et al., 2020:224).

Sorghum is a cereal crop with significant potential for development in Indonesia due to its broad adaptability. This plant can grow in a variety of environmental conditions, including dry, waterlogged areas, and marginal land. Furthermore, sorghum is relatively resistant to pests and diseases. Globally, sorghum grain has a variety of uses, from food and animal feed to industrial raw materials.

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In terms of its contribution to global food security, sorghum ranks fifth after wheat, rice, corn, and barley. In developed countries, sorghum grains are generally used as poultry feed, while the stems and leaves are used as ruminant feed (Pestarini & Wahyuningsih, 2017:25).

In terms of cultivation, sorghum is a relatively easy crop to cultivate. Yield improvements can be achieved through the application of simple agricultural technologies, such as the use of superior seeds, efficient planting methods, and environmentally friendly pest management and fertilization.

Sorghum Farming

Farming is an activity that involves managing and regulating various factors of production, such as land, labor, and capital, to achieve optimal profits. Farming has methods for determining, regulating, and coordinating the efficient use of these factors, so that the business can generate maximum income (Wosal et al., 2020:58). One of the factors that plays a role is the farmer's socioeconomic factors, which include age, education level, farming experience, number of dependents, and land ownership (Sa'diyah & Irham, 2018:4).

Boekoesoe & Ramlan (2023:47) emphasize the importance of strengthening farmer capacity as part of an empowerment strategy. This approach targets not only farmers but also other business actors in the agricultural sector, with the goal of increasing productivity, increasing income, and promoting prosperity for all parties involved.

Farming Costs

Anjelika & Dahliana, (2023:124). The Concept of Farming Costs. Costs play a crucial role in farming activities. A farm can be considered successful if it fulfills all obligations to cover all costs incurred in farming activities. Production costs include all forms of expenditure required to acquire production facilities and supporting materials needed to produce agricultural output.

In addition, costs can also be categorized into fixed costs and variable costs, depending on whether the amount changes or remains the same with the level of production.

Fixed Costs

Fixed costs are costs that remain constant despite fluctuations in output or production volume. This means that these costs must be incurred regardless of the size of production activities. Examples of fixed costs include: land rental, depreciation of agricultural equipment and machinery, construction or development costs of production facilities, and operational costs not directly

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related to production volume, such as permanent employee salaries and routine maintenance (Nugraha et al., 2022:164).

Variable Costs

These costs are considered variable when related to the amount of output produced, but when calculated per unit, their value tends to remain constant. Variable costs play a crucial role in the contribution margin, as manufacturing companies are required to continuously manage costs, including variable costs, to improve operational efficiency. With proper management, the contribution margin can also increase (Rachmawulan & Prasetyo, 2017:22).

Farm Business Income

Income is the total amount of money earned from sales. After deducting explicit costs, income is generated. This can be achieved using income analysis, which is created by calculating the difference between the total costs incurred during a production cycle and the income earned by farmers (Saputro & Sariningsih, 2020:211).

According to research conducted by (Nearti et al., 2020:62), the R/C ratio is an indicator used to measure the ratio between a business's total revenue (Revenue = R) and its total costs (Cost = C). This ratio can determine whether a business is profitable or not.

The comparison between revenue (R) and costs (C) can produce three possibilities, namely: R/C < 1, R/C = 1, and R/C > 1. The interpretation of this ratio is as follows: if R/C < 1, then the business is considered not feasible; if R/C = 1, then the business is in a break-even condition; whereas if R/C > 1, then the business is declared not feasible or less profitable for farmers.

Farm Income

Revenue, often referred to as the proceeds from the sale of factors of production in the manufacturing sector, is earned when these factors are purchased and used as inputs in the production process at prevailing market prices. A company's primary source of revenue comes from sales activities.

Net income in farming activities (Ibrahim et al., 2021:180) is the result of the difference between the total income earned and the total costs incurred during production. Total income includes all income from the sale of agricultural products in a period, both in the form of raw and processed products. On the other hand, total costs include all expenses required in the production process, such as workers' wages, the purchase of production inputs (seeds, fertilizers, and pesticides), the use of agricultural tools and machinery, and other operational costs. Therefore, net income can be defined as the profit obtained after deducting all production expenses.

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Feasibility of Sorghum Farming

Farming feasibility involves a comprehensive assessment of both financial and non-financial aspects to ensure the sustainability of business activities. From a financial perspective, feasibility can be analyzed through several indicators such as the break-even point, the ratio of revenue to costs, the benefit-to-cost ratio, and the gross profit margin. Meanwhile, from a social and economic perspective, business success is greatly influenced by the capabilities of farmers, the support of field extension workers, and the business's impact on community welfare. Furthermore, business sustainability is also largely determined by external factors such as socio-cultural conditions, political stability, and the geographic location of the business area, all of which collectively support regional economic development.

RESEARCH METHOD

Location and Time

The locations were selected through *purposive sampling*, considering that the four regions are active in sorghum cultivation. The locations were selected based on several criteria, such as high production potential, the area of land used for cultivation, and easy access to field data and information.

This research was conducted in four sorghum center districts in Gorontalo Province, namely: (1) Gorontalo Regency: Tibawa District and Sipatana District, (2) Gorontalo Regency: Taluditi District, (3) Boalemo Regency: Paguyaman District, (4) Bone Bolango Regency: East Suwawa District and East Bulothalangi District.

The data collection and field observation process took place during the period from May to September 2025.

Types of research

This research is a descriptive quantitative study aimed at describing and analyzing the feasibility of sorghum farming in Gorontalo Province. The collected data was then systematically analyzed to determine whether sorghum farming in Gorontalo Province is financially viable.

Data Types and Sources

Data sources are anything that can provide information about data based on its source, data is divided into two, namely primary data and secondary data (Diana & Rofiki, 2020:341).

Sampling Techniques

The population in this study included all sorghum farmers in Gorontalo Province, according to the research location. Of these, 20 farmers were selected

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as respondents. The sample was selected purposively, considering that the area is a sorghum cultivation area. Therefore, all sorghum farmers in the area were selected as respondents.

Data collection technique

Observation

Observation is a data collection technique by seeking information about the research area, to obtain a general overview of the research area and to find out about sorghum farming activities in Gorontalo Province.

Documentation

Documentation is a process that includes a series of activities, starting from data search, research, information collection, understanding, utilization, to providing documents related to farmers who have cultivated sorghum in the Gorontalo Province.

Data Analysis Techniques

Production cost

To find out the amount of production costs incurred, it can be calculated using the following formula (Kasim, 2004).

$$TF = FC + VC$$

Where :
TF = Total Cost
TFC = Total Fixed Cost
TVC = Total Variable Cost (total variable costs)

Business Receipts

Business income is the income earned by farmers, calculated by multiplying total production by the selling price of the commodity being cultivated (Wasdiyanta et al., 2023:44). Mathematically, this can be expressed in the following equation.

$$TR=PXQ$$

Where :
TR = Total Revenue (total income)
P = Total Price

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Q = Production obtained in farming

Farm Income

Farm income is the difference between the total income earned by farmers and the total costs incurred, resulting in a net profit (Soekartawi, 1989). Mathematically, this concept can be expressed using the following formula.

$$I=TR- TC$$

Where :
I = Income
TR = Total Revenue (total income)

TC = Total Cost

Net Profit Margin (NPM)

Net Profit Margin (NPM), or net profit ratio, is a measure used to assess a business's ability to generate net profit from every rupiah of revenue earned. This ratio indicates the efficiency of cost management and the effectiveness of overall business activities.

According to Utami et al., (2024:37), the ideal standard Net Profit Margin value is 15%. The formula for calculating NPM is:

$$\text{Net Profit Margin} = \frac{\text{Profit Clean} \times 100\%}{\text{Sale}}$$

Gross Profit Margin (GPM)

Gross Profit Margin (GPM) or gross profit ratio is a profitability indicator used to measure a business's ability to generate gross profit from every rupiah of revenue earned.

The standard Gross Profit Margin value considered good is around 20%. The formula for calculating NPM is:

$$\text{Gross Profit Margin} = \frac{\text{Gross profit} \times 100\%}{\text{Sale}}$$

For the second problem, a feasibility study analysis of the farming business was conducted. The results of the analysis tool determine the feasibility of sorghum farming in Gorontalo Province. The following formula was used to analyze this feasibility:

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$$\text{R/C } Ratio = \frac{TR}{TC}$$

Where :
TR = Total Revenue / Total Farm Business Income (Rp)
TC = Total Cost / Total Cost (Rp)
R/C = Revenue Cost Ratio / Feasibility Description:
If R/C > 1, the business is economically feasible.
If the R/C Ratio = 1, it means that the business undertaken is break-even.
If the R/C Ratio < 1, the business being undertaken is said to be economically unfeasible.

Investment Costs

Investment costs are expenses incurred by farmers to purchase goods or services needed from land preparation to the start of the farm, measured in Rupiah (Rp). Investment costs consist of:

1. Land rental costs are assessed in Rupiah units.
2. Purchase of seedlings is calculated per tree and expressed in rupiah per hectare.
3. Purchase of basic fertilizer (manure) is calculated in kilograms and expressed in rupiah.

RESULTS AND DISCUSSION

Description of Sorghum Farming

Sorghum farming in Gorontalo Province is spread across four administrative regions: Pohuwato, Boalemo, Gorontalo, and Bone Bolango Regencies. This cultivation is generally carried out on wetlands, with most farmers cultivating their own land. The average cultivated area ranges from 0.1 to 2 hectares. However, farmers face complex challenges, particularly related to the rising prices of various production inputs such as seeds, fertilizers, pesticides, labor costs, land rent, and other operational needs. These rising costs increase total production costs, which ultimately can reduce farmers' incomes. Furthermore, pests and plant diseases pose a serious threat, causing reduced yields and even crop failure.

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Cost Structure, Revenue, and Income of Sorghum Farming

Fixed Costs

Table 1
Fixed Costs of Sorghum Farming in Gorontalo Province, 2025

Type of Fee	Amount (Rp)	Average/Farmer
Equipment Depreciation	2,809,898	140,495
Amount	**2,809,898**	**140,495**

Source: Data obtained, 2025

Based on the data in the table, it is known that the fixed costs recorded in sorghum farming only come from depreciation of equipment, with a total of IDR 2,809,898, and the average per farmer reaches IDR 140,495.

Variable Costs

Table 2
Fixed Costs of Sorghum Farming in Gorontalo Province, 2025

	Type of Fee	Amount (Rp)	Average/Farmer
1	Seed	3,970,000	198,500
2	Fertilizer	4,025,000	201,250
3	Pesticide	260,000	13,000
4	TKLK	22,630,000	1,131,500
5	Harvest	10,605,000	530,250

Source: Processed Data 2025

Based on the data presented in Table 11, it is known that the total expenditure of farmers for the purchase of seeds reached Rp 3,970,000, with an average expenditure per person of Rp 198,500. Meanwhile, the allocation of funds for fertilizer needs was recorded at Rp 4,025,000, or around Rp 201,250 per farmer. On the use of pesticides, the total cost incurred was Rp 260,000 with an average expenditure per farmer of Rp 13,000. Furthermore, expenditure for non-family labor (TKLK) reached Rp 22,630,000, with an average value per farmer of Rp 1,131,500. The harvest costs that must be borne by farmers were recorded at Rp 10,605,000, with an average of Rp 530,250 per person. Overall, the total variable costs incurred in this sorghum farming activity reached IDR 41,490,000, with an average per farmer of IDR 2,074,500.

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Total Cost

The following table details the use of total costs in sorghum farming by respondent farmers in Gorontalo Province.

Table 3
Total Cost of Sorghum Farming in Gorontalo Province, 2025

Type of Fee	Amount (Rp)	Average/Farmer
1 Fixed Cost	2,809,898	140,495
2 Variable Costs	41,490,000	2,074,500
Amount	**44,299,898.**	**2,214,996**

Source: Processed Data, 2025

Based on the information in the previous table, it is known that the total fixed costs incurred by all respondents reached Rp 2,809,898, with an average expenditure per farmer of Rp 140,495. Meanwhile, the total variable costs used in farming were recorded at Rp 41,490,000, with an average expenditure per farmer of Rp 2,074,500. If these two cost components are combined, the total overall farming costs incurred reach Rp 44,299,898, with an average cost borne by each farmer of Rp 2,214,995.

Receipts and Income

Revenue from sorghum farming is calculated by multiplying total production by the selling price of the sorghum. Meanwhile, sorghum farming income is calculated as the difference between revenue earned and all costs incurred in sorghum farming activities.

Table 4
Income and Revenue of Sorghum Farming in Gorontalo Province, 2025

Type of Fee	Amount (Rp)	Average/Farmer
1 Acceptance	87,375,000	4,368,750
2 Total Cost	44,299,000	2,214,995
Amount	**44,299,898.**	**2,153,755**

Source: Processed Data, 2025

Based on the results of data collection from 20 farmer respondents, the total income obtained was Rp 87,375,000, with an average income per farmer reaching Rp 4,368,750. Meanwhile, the total production costs incurred by all respondents were recorded at Rp 44,299,898, or around Rp 2,214,995 per farmer. By comparing the total income and costs incurred, it can be calculated that the net income obtained reached Rp 43,075,102, with an average income per farmer of Rp 2,153,755.

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Net Profit Margin

Calculation of net profit margin in sorghum farming

Net profit is calculated from the difference between revenue and income, following the calculation of Net Profit Margin:

Total Revenue – Total Cost = (87,375,000 – 44,299,898 = 43,075,102)

NPM formula:

$$\text{NPM} = \left(\frac{43.075.102}{87.375.000}\right) \times 100\% \approx 49.27\%$$

Based on the Net Profit Margin (NPM) calculation, it is known that sorghum farmers earned a net profit of Rp 43,075,102 from a total revenue of Rp 87,375,000. From this comparison, the NPM ratio was obtained at 49.27% per planting season. This indicates that every Rp 100 in sales received by sorghum farmers in Gorontalo Province is able to provide a net profit of Rp 49.27. In other words, sorghum farming provides a fairly high profit margin and reflects business efficiency in one planting season.

From the results obtained, it indicates that the average value of the Net Profit Margin ratio has a fairly high value, this is because the value of this ratio is already above the average standard ratio of a good Net Profit Margin industry, which is 20%. This indicates that, the higher the percentage of net profit margin obtained, the higher the net profit obtained. As stated by Utami et al., (2024:37). that the higher the percentage of net profit margin obtained, the more the business is able to obtain sales results into net profits.

Gross Profit Margin

Calculation of Gross Profit Margin for Sorghum Farming

Gross profit is calculated from the difference between revenue and total production costs, the following is the calculation of Gross Profit Margin

Total Revenue – Variable Costs = (87,375,000 – 41,490,000 = 45,885,000)

GPM formula:

$$\text{GPM} = \left(\frac{45.885.000}{87.375.000}\right) \times 100\% \approx 52,51\%$$

Based on the Gross Profit Margin (GPM) calculation, it is known that sorghum farmers earned a gross profit of Rp 45,885,000 from a total revenue of Rp 87,375,000 in one planting season. From this comparison, the GPM value was obtained at 52.51%. This indicates that for every Rp 100 of sorghum sales received by farmers in Gorontalo Province, they were able to generate a gross profit of Rp 52.51. Thus, it can be concluded that sorghum farming is quite

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operationally efficient and provides significant profits before deducting fixed costs.

The results obtained indicate that the average Gross Profit Margin ratio is quite high, as this ratio is above the industry's average standard of a good Gross Profit Margin ratio of 15% (Kuznietsova et al., 2024:550). Consequently, the higher the Gross Profit Margin of a business, the better the condition of the sorghum farming business run by farmers.

Feasibility of Sorghum Farming

Financial Aspects

In farming operations, a feasibility analysis serves to evaluate the extent to which the business generates profits for farmers and to determine whether the farming activity is feasible. One common method for measuring business feasibility is the R/C ratio analysis. The R/C ratio compares total revenue to total costs.

Type of Fee	Amount (Rp)	Average/Farmer
1 Acceptance	87,375,000	4,368,750
2 Total Cost	44,299,000	2,214,995
R/C Ratio 1:2	**1.9**	**1.9**

Processed Data Source, 2025

Based on the data in the table above, the results of the R/C Ratio analysis of 20 respondent farmers show an S value of 1.9, and the average value per farmer also reached 1.9. According to financial feasibility criteria, a farming business is said to be profitable and feasible to run if the R/C Ratio value is greater than 1 (R/C > 1).

Based on these calculations and theoretical basis, it can be concluded that sorghum farming in Gorontalo Province is feasible for further development, as it meets the criteria for financial efficiency with a high R/C ratio. Furthermore, this value also indicates that sorghum farming activities can generate substantial profits for farmers, potentially improving the welfare of farming households in the region.

CONCLUSION

Based on the results of the analysis and discussion that have been described previously, the following points can be concluded:

1. Sorghum farming in Gorontalo Province has a total production cost of Rp 44,299,898 per planting season, consisting of fixed costs of Rp 2,809,898 and variable costs of Rp 41,490,000. Total revenue reaches Rp 87,375,000 with a

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net income of Rp 43,075,102. This indicates that sorghum farming provides quite high profits. Financially, the Gross Profit Margin (GPM) value of 52.51% and Net Profit Margin (NPM) of 49.27% indicates efficient cost management and high profit potential.

2. The feasibility analysis results show an R/C ratio of 1.9, meaning that every Rp1 of costs generates Rp1.9 in revenue. Because this value is greater than 1, sorghum farming in Gorontalo Province is considered profitable and feasible for development as a sustainable agricultural enterprise.

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