International Journal of Technology and Education Research

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E-ISSN: 2986-0733

Analysis of Production and Income from Mixed Cropping Systems between Cocoa and Durian in Matanggorai Village, Padangguni District, Konawe Regency

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Abstract

This study aims to find out 1) Production of mixed agricultural system between cocoa and durian and 2) Income of mixed agricultural system between cocoa and durian in Matanggorai Village, TPadangguni District, Konawe Regency. The research was conducted in Matanggorai Village, Padangguni District, Konawe Regency, Southeast Sulawesi Province. This research starts from March to June 2024. The population in this study is all farmers who apply the Mixed Cocoa and Durian agricultural system in Matanggorai Village, Padangguni District, Konawe Regency as many as 20 people. The sample determination technique used in this study is using the census sampling method. The census sampling technique is a technique characterized by taking the entire population as a research sample, so that the sample used in this study is 20 people. The data analysis used is revenue analysis, production analysis and Joint Cost. The results of the study showed that the production of Mixed Farming Between Cocoa and Durian in Matanggorai Village, Padangguni District reached Rp 1,639,092.08/season. This productivity reflects the efforts of farmers in implementing efficient cultivation techniques and the use of appropriate inputs to support farming. The average income of farmers who apply the Mixed Agriculture system between cocoa and durian in Matanggorai Village is Rp 20,4299,696.9/season.This sizable net income shows the effectiveness and efficiency in farming, as well as the high profitability potential of the implementation of the cocoa and durian mixed agriculture system in this region

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Keywords: Cocoa, Durian, Production, Income, Mixed Farming

INTRODUCTION

Plantation is an activity of cultivating certain crops on land or other growing media through the application of technology, management, and capital to produce goods and services that are beneficial for improving the welfare of the community (Darmawan, 2021). One form of agriculture is smallholder farming, which is the cultivation of crops by communities on a limited scale of land, including commodities such as oil palm, coffee, rubber, cocoa, durian, cloves, and various other crops (Supriadi & Sarifuddin, 2013). Among these various commodities, cocoa is a strategic commodity because it plays a major role as a source of foreign exchange, a pillar of the farmers' household economy, and a driver of national agro-industry growth. However, cocoa productivity in Indonesia has been declining, with production in 2022 recorded at only 650,612 tons, lower than in 2021, which reached 688,210 tons (Indonesian Cocoa Plantation Statistics, 2023).

This decline in production has encouraged farmers to adopt alternative cultivation systems that are more adaptive and sustainable. One such system is mixed cropping, which involves planting two or more types of crops on the same land to increase land efficiency, reduce production risks, and increase income (Kriswantoro & Wahyudi, 2015). In the context of cocoa commodities, integration with durian trees is a popular choice because durian trees can function as shade trees, maintain moisture, improve soil quality through litter, and create a microclimate that supports cocoa productivity. Conversely, the presence of cocoa helps optimize the photosynthetic activity of durian trees by increasing light utilization efficiency (Azizah, 2023).

Matanggorai Village in Padangguni Subdistrict is one of the cocoa-producing areas in Konawe Regency, with a planting area of 135 hectares and a production of 60.10 tons. In addition to cocoa, the local community also cultivates durian as an additional source of income. However, data from the Padangguni Subdistrict BPS (2024) shows that cocoa production has declined significantly from 96 tons (2019) to only 17 tons (2022). On the other hand, durian production has increased rapidly during the same period. This situation highlights the importance of reassessing the cultivation patterns applied, particularly the mixed cocoa–durian farming system widely practiced by farmers.

A number of previous studies have shown that combining crops on a single plot of land can increase income. Putri (2019) found that cocoa farmers' income is greatly influenced by production levels, selling prices, and marketing channels, making efforts to increase production an important factor. Anisa's (2021) research on black pepper farming also revealed that mixed

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cropping systems result in higher productivity and income as well as lower business risks compared to monoculture. In addition, Wonda and Tamayu (2016) showed that cocoa farmers' income is highly dependent on land area and management efficiency, so integrating other crops has the potential to increase the efficiency of limited land.

Given these developments, it is important to conduct a scientific analysis of production and income in the cocoa-durian mixed farming system, especially in areas dominated by smallholder plantations such as Matanggorai Village. This study is expected to provide an empirical picture of the effectiveness of mixed cropping in increasing farmer productivity and income, as well as to serve as a consideration for local governments and plantation businesses in formulating strategies for sustainable plantation development.

METHOD

This research method was conducted in Matanggorai Village, Padangguni Subdistrict, Konawe Regency, which was deliberately chosen (purposive) because the area is an area that implements a mixed cropping system for cocoa and durian crops. The research took place from November 2024 to April 2025. The research population included all farmers who practiced the cocoa-durian mix cropping system in Matanggorai Village, totaling 20 farmers. Because the population size was relatively small, the sample was determined using census sampling, so that all members of the population were included in the research sample.

Data collection was carried out using several techniques, namely direct observation at the research site, structured interviews using a prepared list of questions to obtain information from respondents, and documentation used to collect supporting data from farmers and relevant agencies. Data analysis was used to achieve the research objectives. The data analysis used in this study was as follows:

Income is the difference between total revenue (TR) and total cocoa and durian costs as formulated.

Pd = TR – TC

Explanation.

Pd = Income (Rp/ha/Year)

TR = Total revenue (Rp/ha/year)

TC = Total costs (Rp/ha/year)

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Total revenue from cocoa and durian is calculated by multiplying the total production of cocoa and durian by the selling price of cocoa and durian per kilogram (Soekartiwi, 2006), which is formulated as follows.

$TR = Y \times P_y$

Explanation.

TR = Total revenue (Rp/ha/year)

Y = Total production (kg/ha/year)

P_Y= Price/Kg (Rp/kg)

Fixed costs incurred by cocoa and durian farmers in Matanggorai Padangguni Village, Konawe Regency, in farming (Suratiyah, 2015), which are formulated as follows.

$TC = FC + VC$

Explanation

TC = Total costs for cocoa and durian (Rp/ha/month)

FC = Fixed Costs

VC = Variable costs

RESULTS AND DISCUSSION

Cocoa and Durian Production in Matanggorai Village

Cocoa production volume is one of the main indicators in assessing the success of cocoa farming in Matanggorai Village, Padangguni Subdistrict, Konawe Regency. High production levels indicate efficiency in farm management and good cultivation environment quality. However, optimal production is not only influenced by land area, but also by several other factors such as plant care methods, seed quality, and the amount of pesticides and fertilizers used. The average cocoa farm production in Matanggorai Village, Padangguni Subdistrict, Konawe Regency can be seen in Table

Table 1. Average Cocoa Production in Matanggorai Village

No	Commodity	Quantity (kg)	Average (kg/h/Year)
1	Cocoa	7,857	393
2	Durian	14,000	700

Based on Table 1, the average production of cocoa and durian farms in Matanggorai Village, Padangguni District, Konawe Regency shows varying cocoa production results. The total

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cocoa farm production is 7,857 kg with an average production of 393 kg. Meanwhile, the total durian production is 14,000 kg with an average production of 700 kg.

Costs of Cocoa and Durian

The costs of cocoa and durian farming are financial expenses incurred to finance the rice farming system during the cocoa and durian season. Costs can be divided into two categories: fixed costs, which include production tools/equipment and land and building taxes that can be used repeatedly, and variable costs, which are consumable.

Table 2 Average Fixed Costs of Respondents in the Cocoa and Durian Farming Industry.

No	Description	Average Cost (Rp)
1	Scissors	23,958.33
2	Sickle	48,578.95
3	Hoe	58,500
4	Weed sprayer	264,667
5	Machete	124,425
6	Land and Building Tax	209,210.53
Total		**726,339.81**

Table 2 shows that the average variable costs for cocoa and durian farming are Rp726,339.81. Fixed costs are used to calculate the cost of production, so that farmers can determine the appropriate selling price. Fixed costs are used to manage budgets, so that farmers can allocate resources effectively. By knowing the fixed costs, farmers can manage resources more effectively. Fixed costs include rent, permanent employee salaries, taxes, and equipment costs, which must still be paid even if production decreases or increases.

Table 3 Average Variable Costs of Cocoa and Durian Farming

No	Description	Average Cost (Rp)	
		Cocoa	Durian
1	Seedlings	4,450,000	1,113,000
2	Fertilizer	316,500	132,750
3	Pesticides	222,000	192,000
4	Herbicides	51,250	51,250.00
5	Labor	40,510.50	-

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Total	5,080,260.50	1,489,000

Table 3 shows that the average variable cost of cocoa farming is IDR 5,080,260.50. Variable costs in rice farming are costs incurred for the procurement of production factors, which are used up in a single production process in cocoa farming. Labor costs are the largest variable cost. This is because labor costs include plant maintenance and harvesting costs. Meanwhile, the average variable cost of cocoa farming is IDR 1,489,000. Variable costs in durian farming are costs incurred for the procurement of production factors, which in cocoa farming are used up in a single production process. Fertilizer costs are the largest variable costs incurred. This is because labor costs include plant maintenance and harvesting costs.

Table 4. Total Costs for Cocoa and Durian

No	Description	Average (Rp)		Total Costs
		Cocoa	Durian	
1	Fixed Costs	726,339.81	726,339.81	
2	Variable Costs	5,080,260.50	1,489,000	
	Total	5,806,600.31	2,215,339.81	8,021,940.12

Table 4 shows that the average total cost of cocoa in Matanggorai Village, Padangguni District, is IDR 8,021,940.12/year. This cost is obtained from the sum of the total cost of cocoa, which is IDR 5,806,600.31/year, and the total cost of durian, which is IDR 2,215,339.81/year. The fixed cost of cocoa is Rp726,339.81/year and the variable cost of cocoa is Rp5,080,260.50/year. The average total cost of durian in Matanggorai Village, Padangguni Subdistrict is Rp2,215,339.81/year. The cost is obtained from the sum of the fixed cost of Rp726,339.81/year and the variable cost of durian of Rp1,489,000/year.

Cocoa and Durian Income

Farm income is the economic value of the sale of cocoa and durian production. The amount of cocoa and durian farm income depends on the total production and the agreed market price, so each commodity has a different level of income. Information on the average rice paddy income in Matanggorai Village can be seen in Table 5.

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Table 5 Average Cocoa Income.

No	Revenue	Average cocoa yield
1	Production (kg)	393
2.	Selling price (Rp/kg)	75,000
3.	Revenue (IDR)	29,475,000

Table 5 shows that the average cocoa income in Matanggorai Village is Rp29,475,000. Income levels are influenced by production levels and cocoa prices. Cocoa prices in Southeast Sulawesi can reach Rp75,000/kg, which indicates that the demand for cocoa in this region is quite high. With an average production of 393. The price of cocoa in Indonesia, especially in Southeast Sulawesi, is relatively high due to several factors:

1. Limited production: Cocoa production in Southeast Sulawesi is limited due to factors such as weather, soil, and pest attacks.
2. High demand: The demand for cocoa in the international and domestic markets is high, causing cocoa prices to increase.
3. High production costs: The cost of cocoa production in Southeast Sulawesi is high due to factors such as labor, fertilizer, and pesticide costs.
4. Dependence on imports: Indonesia still imports cocoa to meet domestic demand, so the price of imported cocoa affects the price of local cocoa.
5. Price speculation: Price speculation by traders and exporters can affect cocoa prices in the market.
6. Infrastructure limitations: Infrastructure such as roads, ports, and warehouses in Southeast Sulawesi is limited, increasing the cost of transporting and storing cocoa.
7. Role of intermediaries: The role of intermediaries in the cocoa trade can affect cocoa prices.

Table 6. Average Durian Revenue.

No	Revenue	Average amount		Total Income
		Local Durian	Kani Durian	
1.	Production (kg)	1,000	625	
2.	Selling Price (Rp/kg)	25,000	35,000	
3.	Revenue (IDR)	25,000,000	21,875,000	46,875,000

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Table 6 shows that after adding up the total and taking the average, the average income from durian in Matanggorai Village is Rp46,875,000. Income levels are influenced by production levels and the selling price of durian. The average income from local durians in Matanggorai Village is Rp25,000,000. The demand for local durians in Southeast Sulawesi is quite high, mainly because the taste and quality of local durians in this area are very good. The price of local durians in Southeast Sulawesi can reach Rp25,000/kg, which shows that the demand for local durians in this area is quite high. With an average production of 1,000/kg, the average income from Kani durians in Matanggorai Village is Rp21,875,000. Kani durian production in Southeast Sulawesi has considerable potential. The price of durians at in Southeast Sulawesi can reach Rp35,000/kg, indicating that the demand for Kani durians in this region is quite high. And the average production is 625 kg.

Based on data from the UPTD Horti-culture Seed Center of Southeast Sulawesi Province, Kani durian production in 2024 reached 1,500 trees, with 799 trees distributed and 701 trees in stock. There is also a production target of 30,000 Kani durian seeds set by the UPTD Seedling Nursery of the Southeast Sulawesi Provincial Horticulture Agency. South Sulawesi itself is one of the largest durian-producing regions in Indonesia. Several areas in South Sulawesi are major durian production centers, including. Additionally, South Sulawesi is also known as one of the largest durian-producing regions in Indonesia, so the demand for local durians in this area is also driven by the need for high-quality durian supplies.

Cocoa and Durian Income

The high level of income from mixed farming of cocoa and durian is part of the maximum production (cocoa and durian) of the farm. The income from mixed farming of cocoa and durian can be said to be the final impact received from production after all farming costs have been incurred. The income from mixed farming of cocoa and durian varies depending on the level of revenue obtained and the costs incurred. Information on the average income from mixed farming of cocoa and durian in Matanggorai Village, Padangguni District, Konawe Regency can be seen in Table 7.

Table 7. Average Farm Income of Cocoa and Durian Farmers.

No	Description	Average Amount (Rp/H/Year)		Total Income
		Cocoa	Durian	
1	Revenue	29,475,000	46,875,000	
2	Total Expenses	5,806,600.31	2,215,339.81	

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Amount	23,668,399.7	44,659,660.2	68,328,059.9

Table 7 shows that the average income of cocoa farming respondents in Matanggorai Village, Padangguni Subdistrict, is obtained from average cocoa revenue of IDR 29,475,000/year minus total production costs of IDR 5,806,600.31/year, resulting in an average cocoa income of IDR 23,668,399/year.The average income of durian farmer respondents in Matanggorai Village, Padangguni Subdistrict, is obtained from an average durian income of Rp46,875,000/year minus total production costs of Rp2,215,339.81/year , resulting in an average durian income of Rp44,659,660.2/year. After the cocoa and durian income is added together, the total income of farmers who implement a mixed farming system of cocoa and durian is Rp 68,328,059.9/year.

Production costs are the costs incurred by farmers each season. Therefore, production costs greatly affect farmers' income. In the production process, both cash and non-cash production costs can be fixed costs, which are costs incurred regardless of seasonal expenditure, because these costs must be incurred by farmers and are not used up in a single production cycle. Variable costs are costs whose amount is related to the amount of production, such as the costs of fertilizers, pesticides, medicines, and labor wages. Therefore, the production costs incurred by farmers must be maximized for the financing of the production season. Currently, there are still variations, with some costs being paid and some being done by the farmers themselves (Saiful. M, 2024).

CONCLUSION

The average production of the mixed farming system of cocoa and durian in Matanggorai Village, Padangguni District, Konawe Regency is 393 kg/year for cocoa and 700 kg/year for durian. The income from the mixed farming system of cocoa and durian in Matanggorai Village, Padangguni District, Konawe Regency is Rp. 68,328,059.9/year, with cocoa income amounting to Rp. 23,668,399.7/year and durian income amounting to Rp. 44,659,660.2/year.

Based on the results of this study, several suggestions can be made to support the optimization of the implementation of a mixed cocoa and durian farming system in order to increase production and income. For future researchers, this study is expected to serve as a reference that can broaden their knowledge and deepen their study of farmer production and income in the mixed cropping system in Matanggorai Village. For farmers, the results of this study can be used as input to improve the management of polyculture farming businesses to be more efficient and sustainable. As for the local government, the findings of this study are

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expected to be taken into consideration in formulating policy guidelines ( ) on cropping patterns and developing more productive agricultural models that are suitable for local conditions.

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