Journal Agrisep: Kajian Sosial Ekonomi dan Agribisnis. 23 (02): 483-500 (2024)

AGRISEP: Journal Of Agricultural Socio-Economic and Agribusiness Studies

https://ejournal.unib.ac.id/agrisep/index

DOI: 10.31186/jagrisep.23.02.483-500

OPTIMIZATION OF THE USE OF INPUT IN TURMERIC FARMING IN IBRU VILLAGE, MESTONG DISTRICT, MUARO DISTRICT, JAMBI

Yusma Damayanti[1)]; Dewi Sri Nurchaini[2)] Riri Oktari Ulma[3)*]

[1),2),3)]*Department Socio Economic of Agriculture, Faculty of Agriculture, University of Jambi, Jambi, Indonesia*

* Corresponding Author: riri_oktari@unja.ac.id

ABSTRACT

This research was conducted in Ibru Village, Mestong District, Muaro Jambi Regency, focusing on turmeric farmers as respondents. The study aimed to achieve three primary objectives: (1) to analyze the production function associated with turmeric farming, (2) to evaluate the level of optimization and economic efficiency in the utilization of production factors, and (3) to determine the optimal use of production inputs in turmeric cultivation. A census approach was employed, encompassing all 26 turmeric farmers in Ibru Village as the study's respondents. The methodological framework utilized the Cobb-Douglas production function analysis, followed by optimization calculations to assess economic efficiency. The results of the study indicated several key findings: (1) land and labor inputs were found to significantly impact the increase in turmeric production per hectare annually, while the inputs of seeds and compost fertilizers did not show a significant effect on production levels; (2) the current use of land and labor in turmeric farming was identified as economically inefficient; and (3) optimization analysis suggested that there is potential for expanding turmeric farming to 1,925 hectares, with a corresponding increase in labor utilization to 31,213 labor days (HOK). These findings provide valuable insights into the efficiency of production practices in turmeric farming and offer guidance for potential improvements and expansion in the sector.

Keyword: *Agricultural Inputs, Cobb-Douglas, Economic Efficiency, Production Function, Turmeric Farming*

* Submitted: June 27, 2024
Accepted: August 29, 2024

***Cite as*:**
Damayanti, Y., Nurchaini, D. S., & Ulma, R. O. (2024). Optimization Of The Use Of Input In Turmeric Farming In Ibru Village, Mestong District, Muaro District, Jambi. Jurnal AGRISEP: Kajian Masalah Sosial Ekonomi Pertanian Dan Agribisnis, 23(02), 483–500. https://doi.org/10.31186/jagrisep.23.02.483-500

INTRODUCTION

Turmeric (*Curcuma longa*) is a significant biopharmaceutical plant, recognized for its multifaceted uses as a herbaceous spice and medicinal herb. Widely known for its rhizomes, turmeric has been utilized for centuries in various cultures for its purported health benefits, including its role in enhancing immunity. Its importance has been accentuated during the Covid-19 pandemic, during which there was a notable increase in its demand as a natural remedy (Shaleha, 2022). The habit of consuming turmeric in the form of herbal drinks is prevalent not only in Indonesia but also globally, reflecting its widespread acceptance as a valuable component in traditional and modern medicine. The medicinal value of turmeric is well-documented. It is cited in numerous traditional recipes and official pharmacopoeias, and it holds a place in the WHO's list of priority medicinal plants (Hartati, 2013). This prominence is attributed to its active compounds, such as curcumin, which are believed to possess various therapeutic properties. Turmeric's extensive use in both culinary and pharmaceutical contexts underscores its significance in global health practices.

In Indonesia, turmeric cultivation is extensive, spanning across all 34 provinces. This widespread cultivation contributes to its status as one of the leading biopharmaceutical plants in the country. According to Sinaga & Mimy (2023), turmeric's production surpasses that of other biopharmaceutical plants like ginger, laos, kencur, lempuyang, and temulawak. Specifically, turmeric constitutes 36.4% of the total production of biopharmaceutical plants in Indonesia (Kanaya & Firdaus, 2014). With a total biopharmaceutical plant production of 531,673,562 kg, turmeric's share amounts to 193,582,819 kg, making it the most produced biopharmaceutical plant in the country, followed by ginger with 183,517,778 kg (BPS, 2020).

The province of Jambi is notably significant in turmeric production. It ranks among the top 15 turmeric-producing provinces in Indonesia. In 2018, Jambi Province produced 779,496 kg of turmeric, but this figure declined to 421,173 kg in 2019. However, there was a resurgence in 2020, with production reaching 499,283 kg (BPS, 2020). This fluctuation highlights the potential for growth and underscores the importance of efforts to stabilize and enhance turmeric production in the region. Within Jambi Province, Muaro Jambi Regency stands out as a major turmeric-producing area. In 2020, Muaro Jambi Regency contributed 36,676 kg to the province's total turmeric output (BPS, 2020). Ibru

ISSN: 1412-8837 e-ISSN: 2579-9959

Village, located in Mestong District, is one of the prominent turmeric-producing villages within this regency. The village covers an area of 18,884.20 hectares and is actively engaged in developing turmeric cultivation with a focus on market-oriented production (Widaryanto & Azizah, 2018). The turmeric produced in Ibru Village is sold both fresh and processed into turmeric powder, which is dried and ground into simplicia (Santoso et al., 2023). This dual approach to production and processing is aimed at meeting market demands and supporting the local economy.

The cultivation of turmeric in Ibru Village is primarily conducted on small-scale plots, typically less than 1000 m^2 or 0.1 hectare. Despite the limited scale, the farmers are motivated by market demand. The turmeric produced in Ibru Village is supplied to traditional markets and main markets through local traders (Kurniawan, 2016). This demand-driven approach encourages farmers to continuously expand and improve their cultivation practices. The significant market opportunities for turmeric and its processed products have led to increased interest and investment in local turmeric farming (Fairuz, 2022). The farming practices in Ibru Village are largely conventional, utilizing simple agricultural tools such as hoes, machetes, and sickles. The use of these basic tools, combined with the reliance on organic fertilizers and compost, reflects the traditional methods employed by local farmers (Fairuz, 2022). Additionally, pesticides are used to manage fungal infections, which are common in turmeric cultivation (Masnang et al., 2022). Despite the conventional methods, Ibru Village has achieved notable results, with superior seeds yielding an average of 2.5 kg of rhizomes per plant and plant heights reaching up to 150 cm. This performance exceeds the general yield range of 0.75-1 kg per plant reported by the Ministry of Agriculture (2020). The relationship between input and output in turmeric farming is crucial for optimizing productivity and enhancing farmer income. The optimal use of inputs relative to output prices is a key indicator of economic efficiency in production (Wardani & Nurhayati, 2023). At the farmer level, the selling price of turmeric rhizomes ranges from IDR 4,000 to IDR 5,000 per kilogram (BPS, Jambi Province, 2020). Input prices for compost, pesticides, and labor wages remain relatively stable, which impacts the overall economic efficiency of turmeric farming.

To improve turmeric productivity in Ibru Village, it is essential to understand the principles of input-output relationships and to determine the optimal use of inputs. Effective decision-making regarding input use can significantly enhance production efficiency and farmer income (Nurchani et al., 2020). Formulating a production function is a crucial step in assessing whether current input use is optimal or if adjustments are necessary to achieve better production outcomes (Anjelika & Dahliana, 2023). The production function represents the combination of various inputs to produce output and can be analyzed using tools such as the Cobb-Douglas production function (Doll &

Orazem, 1978; Soekertawi, 1994). If the marginal product of a product aligns with the ratio of input and output prices, it indicates efficient allocation of resources (Turukay, 2023). Understanding this relationship is fundamental to achieving economic efficiency in turmeric farming.

In summary, turmeric farming involves the integration of land, labor, and capital managed by farmers to achieve desired production levels (Kusnadi et al., 2020). The ability to reach certain production levels directly affects income, highlighting the importance of optimizing production practices. The objectives of this research are to: (1) describe the production function in turmeric farming within the study area, (2) analyze the economic efficiency of input use, and (3) employ a calculation approach to determine the optimal use of inputs for turmeric farming.

RESEARCH METHOD

Place And Time Of Research

This research was conducted in Ibru Village, Mestong District, Muaro Jambi Regency. The study period spanned from April 1 to April 30, 2022. Data collection focused on the turmeric farming production cycle, specifically covering the period from January 2021 to December 2021.

Data Collection

The research utilized both primary and secondary data sources. Primary data were collected directly from the turmeric farmers through surveys and interviews. This data provided firsthand insights into the farming practices and production details. Secondary data were gathered from research reports, academic literature, and reports from relevant governmental and non-governmental agencies. These secondary sources offered contextual information and background relevant to turmeric farming in the region.

Data Analysis

The analytical model used to determine how much influence the use of production factors has on turmeric production is Cobb Douglas production function analysis whose formulation is

$$Y = aX_1^{b1} \cdot X_2^{b2} \cdot X_3^{b3} \cdot X_4^{b4} e^u$$

To facilitate analytical estimation, the Cobb Douglas function equation is converted into a natural logarithm equation as follows:

$$LnY = Lna + b_1 LnX_1 + b_2 LnX_2 + b_3 LnX_3 + b_4 LnX_4 + \varepsilon Lnu$$

Where: Y= Turmeric production (kg/year/ha); X1= land (ha); X2= Labor (HOK); X3= Compost (kg); X4= pesticide (liter); bi= regression coefficient (production elasticity). The regression coefficient value from the equation describes the magnitude of the production elasticity (bi) of input use. By knowing the amount of bi and the price (output and input), the level of optimization/economic efficiency of input use in turmeric farming can be calculated, which is the second objective of this research.

Economic efficiency is achieved if NPMXi / HXi = 1. If NMPXi / HXi is less or greater than 1 then there is a production condition that is not or not yet efficient (Doll and Orazem 1978). Linked to the bi value, this economic efficiency criterion can be formulated as follows.

$$IE = \frac{bi \cdot \frac{Y}{Xi} Hy}{Hxi} = 1$$

Where, IE= Level of economic efficiency; bi= Production elasticity; Y= Production quantity, Hy = Output price, Hxi= Input factor price.

To determine the optimum use of production factors, the formula is used:

$$Xi^* = \frac{bi \cdot Y \cdot Hy}{Hxi}$$

Where: Xi* = Optimum number of inputs.

This formula is derived from criteria that still condition the use of optimum (economically efficient) inputs, namely when NPMXi /HXi = 1 or NPMXi = HXi Where Xi* is used as a variable whose optimum value will be sought by taking into account bi, product (Y), output price (Hy) and input prices (Hxi). Doll and Orazem (1978) stated that in economic terminology the most profitable amount is called the optimum amount. In this terminology, the goal that a producer as a manager wants to achieve is economic efficiency, which can be approached by measuring income maximization. Therefore, the term "optimal production conditions that provide maximum income so that economic efficiency is achieved" is a term that provides the same meaning that can be used interchangeably. Then by Teken and Asnawi, (1977) it was stated that the criteria for economically optimum production levels could be calculated using the maximum income approach from a production business.

RESULT AND DISCUSSION

General Description Of Respondents

The identity of turmeric farmers in this study provides insights into their backgrounds and conditions. The sample includes all 26 turmeric farmers in Ibru Village and students involved in turmeric cultivation research. Key aspects of their identity include age, family size, education level, farming experience, and land area. The age range of the farmers is from 22 to 100 years, with a majority (61.50%) between 35 and 47 years, indicating a predominantly productive age group. Educationally, the sample varies from no formal education to a bachelor's degree, with 38.50% holding high school diplomas. Higher education could potentially lead to better input usage and more informed decision-making among turmeric farmers. Farmers with more education might be better equipped to understand and apply modern farming techniques, manage resources efficiently, and adopt sustainable practices, leading to higher productivity. However, in this sample, since a significant proportion has only high school education, the extent to which formal education translates to better practices in turmeric farming requires further investigation, possibly through comparative analysis of yields, input usage, and profitability across different education levels.

Family size ranges from 1 to 7 members, with the most common being families of 4 (53.80%), which influences labor availability and economic needs. Farming experience ranges from 1 to 37 years, with 80.80% having 1 to 6 years of experience, suggesting many are relatively new to farming. More experienced farmers may achieve higher yields due to their accumulated knowledge of local conditions, pest control, and optimal planting practices. However, given that 80.80% of the farmers in this study have only 1 to 6 years of experience, many may still be in the learning phase, potentially limiting their efficiency and yield optimization. This group could benefit from targeted interventions aimed at enhancing their farming skills and knowledge. Conversely, farmers with decades of experience might have more refined methods that result in better productivity, but this relationship should be empirically tested to confirm a direct correlation between experience and yields. These characteristics collectively influence their farming practices and decision-making processes, impacting the efficiency and productivity of turmeric cultivation. The identity of the turmeric farmers in Ibru Village encompasses a range of characteristics, including age, education, family size, experience, and land area. These factors collectively influence their farming practices, productivity, and the overall effectiveness of turmeric cultivation. Understanding these aspects provides valuable insights into the dynamics of turmeric farming in the region and helps identify opportunities for improving agricultural practices and outcomes.

Use Of Inputs In Turmeric Farming

In the research area, turmeric farmers cultivate their own land, with an average land area of 400 m² or 0.04 hectares per farm. The usage of inputs such as seeds, labor, and compost in turmeric farming is detailed in Table 1. The table provides data on the average input use per planted area and per hectare.

Table 1. Average Input Use In Turmeric Farming In The Research Area In 2022

Input	Use Per Planted Area	Use Per Hectare
Seed (kg)	28.00	718.40
Labour (HOK)	9.10	229.61
Compost (kg)	1,503.80	37,961.20

Source: Primary Data Processing Results, 2022

The seeds used by farmers are superior varieties known locally as Gajah or Butun seeds. According to Pramudyo (2018), the recommended seeds for turmeric are rhizomes aged between 1 and 18 months. For optimal results, the recommended seed requirement per hectare ranges from 500 to 700 kg for rhizome saplings and 1,000 to 1,500 kg for broodstock. The average seed usage reported in Table 1 aligns with these recommendations, indicating that farmers in the research area adhere to these guidelines.

Labor productivity in turmeric farming, as measured by "HOK" (person-days), shows an average of 9.10 HOK per 400 m² of cultivated land, equivalent to 229.61 HOK per hectare. This reliance on labor, particularly family labor (which constitutes 88% of the total), suggests a traditional farming system with limited mechanization. External labor is also used, paid at a rate of IDR 80,000 per day. However, the data raises concerns about potential inefficiencies in labor management. Introducing small-scale mechanization, such as mechanized compost spreaders or soil preparation equipment, could reduce labor hours spent on repetitive tasks like compost application, land preparation, and weeding. This would free up labor for more specialized tasks and reduce overall labor input per hectare, thus improving productivity. Given that farmers depend heavily on family labor, which may not always be specialized or as efficient as hired labor, there may be room for improvement in labor productivity (Megasari et al., 2019). Since family labor constitutes a large portion of the workforce, better labor division and training can lead to increased efficiency. By assigning specific roles to family members based on their strengths or expertise, and providing targeted training in critical areas such as compost management and crop care, productivity could be enhanced. For instance, the reliance on manual labor for compost application and other tasks could be streamlined through better organization of labor tasks, training, or introducing simple mechanized tools. Additionally, the over-application of compost (37,961.20 kg per hectare, exceeding the recommended 10-20 tons) suggests inefficiencies not just in labor but also in input management, which could be contributing to unnecessary labor hours being spent on applying excess compost. The over-application of compost highlights a need for more precise input management. Farmers could be educated on the benefits of adhering to recommended compost quantities, which would not only reduce labor hours dedicated to compost application but also optimize nutrient use for better crop growth and yields.

Farming Production And Income

Turmeric production in Ibru Village reached 734.62 kg per land area, equivalent to 18,544.00 kg per hectare, which falls short of the expected range of 20,000 kg to 30,000 kg per hectare recommended by the Ministry of Agriculture (2019). This underperformance in productivity can be largely attributed to the planting distances employed by the farmers in the research area. While the Ministry of Agriculture suggests a planting distance of 50 cm x 50 cm to optimize turmeric growth, farmers in Ibru Village use varying spacings such as 1 m x 1 m and, in some cases, 2 m x 1 m.

The deviation from the recommended spacing significantly impacts turmeric production. Wider planting distances result in reduced plant density, which lowers the overall yield per hectare due to fewer plants producing rhizomes. Increased spacing also leads to suboptimal resource utilization, as plants are less efficient in using nutrients and water, resulting in lower growth and yield (Harinta & Arianti, 2021). Excessive spacing can cause underdeveloped plants, as they miss out on mutual shading that helps in weed reduction and soil moisture maintenance. Economically, the decreased yield per hectare affects the viability of turmeric farming, leading to lower income and reduced profitability for farmers. Aligning planting distances with the recommended 50 cm x 50 cm could enhance yield, improve resource efficiency, and boost economic returns for farmers in Ibru Village.

One of the goals of farmers in carrying out farming is to earn income (Harya & Wahyuningrum, 2023). Farming income is obtained by subtracting the total farming income from the total costs used in farming. (Suratiyah, 2015) from the research results it is known that the average income from turmeric farming in the research area is IDR 3,565,384.62 per area of land, with the average selling price per kg being IDR 4,923.08. The average production, receipts and income of turmeric farming in more detail in the research area are presented in Table 2.

The economic results of turmeric farming in the research area are promising, with an average income of IDR 2,566,487.18 per land area and an R/C (Revenue-to-Cost) ratio of 3.57. This ratio indicates that for every IDR 1 spent on turmeric farming, farmers generate IDR 3.57 in revenue, significantly exceeding the breakeven point of 1 and underscoring the profitability of the venture. Effective management of production inputs such as seeds, labor, and compost contributes to this high profitability, suggesting that well-managed inputs and practices are key to maximizing yields and revenue. Suratiyah (2015) supports this criterion for evaluating farm financial viability. However, focusing solely on average figures may obscure significant variability in profitability among farmers. While the average metrics are encouraging, profitability can vary widely due to differences in farming practices, input management, land quality, and market conditions. To gain a clearer picture of turmeric farming success, it is important to analyze the range of profitability among farmers, including the highest and lowest values, and to understand the factors influencing these differences (Siadari & Saragih, 2022). Examining the impact of factors such as planting distances and input management on financial outcomes, alongside gathering qualitative insights from farmers about their experiences and challenges, can provide a more comprehensive understanding.

Table 2. Average Production, Revenue And Income Of Turmeric Farming In The Research Area In 2022

Description	Per Land Area	Per Hectare
Production (Kg)	734.62	18,544.00
Reception (IDR)	3,565,384.08	90,000,000.00
Cost (IDR)	998,897.44	25,214,886.73
Income (IDR)	2,566,487.18	64,785,113.27
R/C		3.57

Source: Primary Data Analysis, 2022

A detailed analysis of profitability ranges and targeted support for farmers with lower profitability can help address disparities (Puspitaningsih, 2020). Disseminating successful practices from high-performing farmers and implementing ongoing monitoring systems will further enhance overall productivity and financial success across the farming community (Hartono et al., 2018). By considering both average data and variability, a more nuanced view of economic outcomes and areas for improvement in turmeric farming can be achieved.

The high profitability of turmeric farming also has broader implications for the local economy. As farmers experience financial success, they may spend more on local goods and services, stimulating economic activity in the area. This increased spending can contribute to the growth of local businesses and the creation of new job opportunities, further supporting the economic development of the region (Mayangsari et al., 2024). Additionally, the success of turmeric farming in this area could serve as a model for other regions engaged in similar agricultural activities. By demonstrating the economic viability of turmeric cultivation, this research may encourage other farmers to consider turmeric as a viable crop option. It also provides valuable insights into the practices and conditions that contribute to successful turmeric farming, which can be shared with farmers in other regions to help them achieve similar results. The average income of IDR 2,566,487.18 per land area and the R/C ratio of 3.57 highlight the significant economic benefits of turmeric farming in the research area. The high R/C ratio indicates that the revenue generated from turmeric farming substantially exceeds the costs, reflecting a profitable and financially viable agricultural practice. This success not only improves the financial well-being of individual farmers but also has positive implications for the broader local economy. The findings from this research underscore the potential of turmeric farming as a lucrative agricultural enterprise and offer valuable lessons for other farming communities. Optimizing the Use of Production Factors in Turmeric Farming.

Optimization in this research is an approach to finding the optimum amount of input use in turmeric farming (Risdalia et al, 2020). In the analysis of the physical input-output relationship (production function) there are 4 input variables whose influence will be seen, namely land (X1), seeds (X2), compost (X3) and labor (X4) as the independent variable and output (Y) as the dependent variable. The regression results of the influence of these inputs on turmeric output are presented in table 3. From Table 3. all inputs simultaneously influence turmeric output. The calculated F value is 57.654. This quantity shows a significant value. The coefficient of determination R2 shows a figure of 0.917, which means that 91.7% of the variation in production of turmeric plants can be explained by variations in land, seeds, fertilizer and labor, while the remaining 8.3% is explained by other factors not included in the analyzed model.

Table 3. Estimated Regression Coefficient Of Production Function In Turmeric Farming In The Research Area In 2022

Independet Variable	Regression Coefficient	Probability
Ln X_1 (land)	0.930	0.000
Ln X_2 (seed)	0.097	0.407
Ln X_3 (compost)	-0.050	0.400
Ln X4 (labour)	-0.619	0.063
C (constant)	11.281	0.000
R-squared (R^2)	0.917	
F count	57.654	0.000

Source: Primary Data Processing Results, 2022

The partial effect shows that land input has a small probability of 10% (prob. < 0.10), which means that the addition of 1% land (X_1) has a real effect on increasing turmeric production by the value of the regression coefficient, which is 0.930%. The influence of land area on turmeric production in Ibru village is in line with Mustofa (2016) research on Analysis of Factors that Influence Turmeric Production and Income in Pelem village, Bungkal subdistrict, Ponorogo district. The area of land and labor in this study had a significant effect on turmeric production. In Ibru Village, the potential for land suitable for turmeric farming remains significant due to the considerable amount of underutilized land. According to the monographic data, Ibru Village comprises 43 hectares of residential area, accommodating 209 families. In addition to the residential space, there is another 852 hectares of land that has not been optimally utilized, indicating ample availability for agricultural expansion, particularly for turmeric cultivation. This underutilized land presents an opportunity for local farmers to diversify and expand their farming practices. The unutilized area could be transformed into productive agricultural land, leveraging turmeric's relatively low-input requirements and adaptability to various soil types. With the growing demand for turmeric in the market due to its medicinal and culinary applications, this land could be effectively used to increase local farmers' income and contribute to the economic development of the village.Seed input (X_2) and compost fertilizer (X_3) have no significant effect on increasing turmeric production, this is shown by the probability that these two variables are greater than 0.10 (prob. > 0.10). The lack of influence of seed and fertilizer input on increasing turmeric production could be possible because respondent farmers used the right amount for input of turmeric rhizomes/seeds and even for compost fertilizer exceeding the recommended dose.

The effect of labor input in turmeric farming in the research area shows a small probability significance level of 10% (prob. < 0.10) with a negative regression coefficient of -0.619. This indicates that a 1% increase in labor input leads to a 0.619% decrease in turmeric production, suggesting that additional labor may not be effectively utilized, possibly due to over-employment or inefficiencies in labor management. The average amount of labor used for turmeric farming in the area is 229.61 HOK (Human Labor Days) per hectare, which appears to contribute to reduced productivity. Beyond a certain point, increasing labor does not enhance production and may even harm it, potentially due to diminishing returns or misallocation of labor tasks. This finding aligns with the research of Ismayani (2013), who examined the efficiency of production factor use in turmeric farming in Lampanah Lengah District, Aceh Besar Regency, where an increase in labor input by 1% resulted in a 0.233% reduction in turmeric production when labor usage was at 60.35 HOK per hectare. Both studies suggest that excessive labor in turmeric farming is associated with decreased output, likely due to factors such as diminishing marginal returns, overemployment, poor labor quality and management, lack of complementary inputs, and resource constraints. As labor input increases without corresponding improvements in labor quality or additional inputs, productivity declines, highlighting the need for optimized labor management practices to ensure positive contributions to production. In this study, the result of the sum of the regression coefficients for each use of production inputs that influence turmeric production is ep = 0.311, which means that the use of land and labor production inputs in producing turmeric production in the research area is at a production stage that is physically efficient and meets the conditions or requirements. necessary conditions (necessary conditions) in the study of economic efficiency. These conditions are only related to physical relationships and are rational.

If viewed from a technical perspective, these conditions alone are sufficient to determine the technical efficiency of using production factors in producing turmeric products (Aditya et al, 2019). This is also in line with the statement by Kartasapoetra (1988) that a production function can describe a production method that is technically efficient in the use of resources in a company. However, in relation to knowing the optimum amount (economic efficiency) of production factors, complementary conditions are needed. This condition is often referred to as a choice indicator that can help farmers/managers in determining the optimum amount of input (Doll and Orazem, 1978). The indicator of business choice based on the aim of maximizing income is the price of production factors and products (HXi and HY) in a production process (Teken & Asnawi, 1977).

Economic Efficiency And Optimal Input In Turmeric Farming

The level of economic efficiency of the use of inputs that influences turmeric output that is discussed is the area of labor land (Arsita et al, 2020). Meanwhile, other inputs, namely seeds and compost, are no longer included in this analysis because they have no real effect on turmeric production. Estimates of the ratio of NPM and input prices Xi for land and labor in Ibru village can be seen in Table 4.

Table 4. Estimated NPM Ratio And Input Prices In Turmeric Farming In The Research Area In 2022

Components	Land(Ha)	Labor (HOK)
Turmeric output (Y) = 734.62 kg		
Hy = Rp. 4,923.08/kg		
Input usage (Xi)	0.04	9.10
Regression coefficient	0.930	-0.691
Hxi (IDR/pcs)	1,747,572.82	80,000
NMP_{Xi}	84,085,787.94	274,622,614
NPM_{Xi}/H_{Xi}	48.12	3.43
Conclusion	Not Yet Efficient	Not Efficient

Source: Primary Data Processing Results, 2022

The marginal product value (NPM) of land input is greater than the land rental value of IDR. 1,747,572.82 per hectare so that economically the use of these inputs can still be increased so that turmeric farming activities in the research area can be carried out well to produce optimal production and have implications for increasing income. The ratio of NPM (additional production value) to land rent per hectare shown in the table above is 48.12. Meanwhile, the average size of turmeric farming land in the research area is 0.04 hectares. This shows that economically the use of production factors for turmeric farming land is still very inadequate or has not yet reached optimum conditions. The area of land that can be used by farmers to achieve optimum conditions is 48.12 times the area of land currently cultivated by farmers, which can be cultivated on an area of 1,925 hectares.

The results of this research align closely with the findings of Ismiyani (2013), who identified inefficiencies in the use of land inputs in turmeric farming, particularly concerning the land rental costs incurred by farmers in Lampanah Lengah District, Aceh Besar Regency. Ismiyani's study highlighted that the current scale of cultivation was not sufficient to fully capitalize on the available land, suggesting that the cultivated area could be expanded further to maximize the income potential of turmeric farmers. This indicates that a suboptimal use of land not only affects the cost-efficiency but also limits the overall economic returns, underscoring the need for strategies to utilize the land more effectively to enhance profitability.

Furthermore, from Table 4. above, it is also known that economically the use of labor input in turmeric farming in the research area is not yet efficient (Akib et al, 2017). NPM from the use of labor input is still greater than labor wages of IDR. 80,000 per HOK, which means that partially the workforce in turmeric farming in the research area will be efficient if its use is increased. The ratio of NPM labor input to labor wages is 3.43. The average use of labor in the research area is 9.1 HOK per planting area cultivated by farmers. Therefore, to achieve optimum conditions, the labor that can be used by farmers is 3.43 times the average labor used by farmers, that is, labor can be increased to 31,213 HOK. However, from the production function it is known that technically/physically, the response of turmeric production to additional labor is negative (Yosifani et al, 2021), so of course the optimum number of labor that can be increased needs to be taken into consideration when applied to turmeric farming. So economically farmers can still increase the use of labor input, but physically the production response will decrease if labor input is increased (Fitriadi et al, 2016). This is also in line with research by Ismiyani (2013) where the labor used by turmeric farmers in Lampanah Leng District, Aceh Besar Regency is already quite large so efforts are made to increase turmeric production and profits by reducing the use of labor. To mitigate these risks and promote sustainable practices, it is crucial for farmers to adhere to recommended compost application levels. Implementing integrated nutrient management, combining compost with other fertilizers as needed, can help maintain soil health and reduce environmental impacts. Precision agriculture techniques, such as soil testing and targeted compost application, can further optimize nutrient use and minimize overuse. Additionally, providing training and awareness programs on sustainable compost use and monitoring soil health can support more environmentally friendly practices. By balancing economic gains with environmental stewardship, farmers can enhance the efficiency of turmeric farming while ensuring its long-term sustainability.

CONCLUSION AND SUGGESTION

Conclusion

The use of production factors, labor, seeds and compost simultaneously influences turmeric production. Partially, land area has a positive effect on the increase in turmeric production, while turmeric production gives a negative response to the increase in labor use. Meanwhile, seeds and fertilizer have no effect on production. The addition of seeds and fertilizer technically does not increase the amount of turmeric production because their use, especially fertilizer input, is already more than recommended. The use of land and labor is not yet economically efficient and has the potential to be added. From the optimization results, land use can be increased to the optimal limit of 1,925 hectares. Meanwhile, the economic use of labor can be increased to 31,213 HOK. However, this labor input needs to be taken into consideration when applied to turmeric farming because physically the response of turmeric production decreases if labor input is increased.

Suggestion

1. They should support land expansion initiatives to encourage and facilitate the expansion of turmeric farming land to the optimal 1,925 hectares. This could involve providing access to unused or underutilized land and offering incentives for land consolidation.
2. Enhance labor efficiency, including implementing programs to train farmers on efficient labor use and modern agricultural practices. This could help reduce the negative response of turmeric production to increased labor input observed in the study.
3. Provide financial and technical assistance, such as financial aid and technical support to turmeric farmers to acquire high-quality seeds, modern farming equipment, and effective composting methods. This can help improve overall productivity and economic returns.
4. Promote market access to develop and support market access for turmeric farmers. Establishing better supply chain mechanisms and creating opportunities for farmers to sell their produce at competitive prices can enhance their income.Provide financial and technical assistance such as offer financial aid and technical support to turmeric farmers for the acquisition of

high-quality seeds, modern farming equipment, and effective composting methods. This can help improve overall productivity and economic returns.

REFERENCES

Aditya, D. A. D., Ikka, N. D. A., & Khusaini, M. (2019). Usaha Tani Kunyit, Jagung Dan Kacang Panjang Dengan Sistem Tumpang Sari: Studi Kasus Di Dusun Dlangu Desa Mondoluku Kecamatan Wringinanom Kabupaten Gresik. *AGRIMAS*, 3(1), 50-59. Retrieved from https://journal.unimas.ac.id/index.php/agri/article/view/93

Akib, M. A., Haniarti, H., & Nurjannah, D. (2017). Upaya Pendampingan Wanita Tani Dalam Pengembangan Produk Kunyit Organik Di Kecamatan Bacukiki Kota Parepare. *Jurnal Dedikasi Masyarakat*, 1(1), 1-6. doi: 10.31850/jdm.v1i1.265

Anjelika, V., & Dahliana, A. B. (2023). Analisis Pendapatan Usahatani Kunyit (*Curcuma longa linn*) Di Desa Seberang Kecamatan Lamuru Kabupaten Bone. *Jurnal Insan Tani*, 2(1), 123-132. doi: 10.1234/jit.v2i1.11

Arsita, M., Affandi, M. I., & Situmorang, S. (2020). Kinerja Produksi Dan Nilai Tambah Agroindustri Jamu Bubuk Di Desa Asto Mulyo Kecamatan Punggur Kabupaten Lampung Tengah. *Jurnal Ilmu-Ilmu Agribisnis*, 8(2), 234-241. Retrieved from http://repository.lppm.unila.ac.id/26850/

Badan Pusat Statisitik. (2020b). *Produksi Tanaman Biofarmaka 2020. BPS Provinsi Jambi*. Retrieved from https//jambi.bps.biofarmaka-provinsi-jambi-2020.html.

Badan Pusat Statistik. (2020a). *Produksi Tanaman Biofarmaka (Obat), 2018-2020.* BPS. Retrieved from https://www.bps.go.id/indicator/55/63/1/produksi-tanaman-biofarmaka-obat-.html.

Carolia, N. (2019). Kunyit (Curcuma domestica val) Sebagai Terapi Artritis Gout. *Majority*, 8(1), 251-255. Retrieved from http://repository.lppm.unila.ac.id/16860/

Doll, P.J & Orazem, F. 1978. *Production Economics*. Theory With And Applications. New York: Jhon Wiley and Sons

Fairuz, A. P. (2022). Analisis Kelayakan Saharans Kunyit di Desa Ibru Kecamatan Mestong Kabupaten Muaro Jambi, (Skripsi, Universitas Jambi, Jambi, Indonesia). Retrieved from https://repository.unja.ac.id/38697/

Fitriadi, S., Triatmoko, E., & Hidayat, T. (2016). Analisis Pendapatan Kedelai (Glicine max L) Di Desa Kunyit Kecamatan Bajuin Kabupaten Tanah Laut Provinsi Kalimantan Selatan. *Ziraa'ah Majalah Ilmiah Pertanian*, 41(1), 33-38. doi: 10.31602/zmip.v41i1.318

Harinta, Y. W., & Arianti, Y. S. (2021). Penetapan Prioritas Strategi Marketing Mix Produk Olahan Kunyit (Studi Kasus: Umkm Retno Wangi).

AGRISAINTIFIKA: Jurnal Ilmu-Ilmu Pertanian, 5(2), 159-166. doi: 10.32585/ags.v5i2.2019

Hartati, Sri Yuni. (2013). Khasiat Kunyit sebagai Obat Tradisional Dan Manfaat Lainnya. *In Warta Penelitian Dan Pengembangan Tanaman Industri*, 19(2), 5-11. Retrieved from https://perkebunan.litbang.pertanian.go.id/wpcontent/uploads/2014/02/Perkebunan_KhasiatKunyt,pdf.

Hartono, R., Aritonang, M., & Hutajulu, J. P. (2018). Analisis Efisiensi Faktor-Faktor Produksi Usahatani Padi Sawah Tadah Hujan Di Desa Bukit Batu Kecamatan Sungai Kunyit Kabupaten Mempawah. *Jurnal Sains Pertanian Equator*, *7*(3), 1-14. doi: 10.26418/jspe.v7i3.25152

Harya, G. I., & Wahyuningrum, W. (2023). Analisis Kelayakan Usahatani Kunyit Petani Desa Petiken Yang Tergabung Dalam Kelompok Tani BPP Driyorejo Kabupaten Gresik. *Jurnal Ilmiah Manajemen Agribisni*s, 11(2), 1-22. doi: 10.33005/jimaemagri.v11i2.17

Ismayani. (2013). Efisiensi Penggunaan Faktor Produksi Saharans Kunyit Di Kecamatan Lampanah Lengah, Kabupaten Aceh Besar. *Jurnal Agrisep*, 14(2), 1-14. Retrieved from https://jurnal.usk.ac.id/agrisep/article/view/2373

Kanaya, I. A., & Firdaus, M. (2014). Daya Saing Dan Permintaan Ekspor Produk Biofarmaka Indonesia Di Negara Tujuan Utama Periode 2003-2012. *Jurnal Manajemen & Agribisnis*, 11(3), 183-198. doi: 10.17358/jma.11.3.183-198

Kartasapoetra, A.G. (1988). *Pengantar Ekonomi Produksi Pertanian*. Jakarta: PT Bina Aksara

Kementerian Pertanian. (2019). Standar Operasional Prosedur (SOP) Budidaya Kunyit Karanganyar. Retrieved from https://repository.pertanian.go.id/items/8ff5d471-079a-4364-a672-e16090b124c7/full

Kurniawan, D. (2016). Prospek Pengembangan Agribisnis Padi Organik Di Kabupaten Kediri Guna Mendukung Program Ketahanan Pangan Di Jawa Timur. *Jurnal Ilmiah Inovasi*, 16(1), 22-37. Retrieved from https://publikasi.polije.ac.id/jii/article/view/4

Kusnadi, S., Novita, I., & Miftah, H. (2020). Analisis Pendapatan Usahatani Dan Efisiensi Pemasaran Kunyit (Curcuma Domestica Val). *Jurnal Agribisains*, 6(1), 60-68. doi: 10.1234/jit.v2i1.11

Masnang, A., et al. (2022). Pemberdayaan Petani Jambu Kristal (*Psidium guajava L.*) Melalui Optimalisasi Penggunaan Lahan Berkelanjutan Di Desa Bantarsari, Kabupaten Bogor. *Jurnal Abdi Inovatif (Pengabdian Kepada Masyarakat)*, 1(2), 58-67. doi: 10.31938/jai.v1i2.416

Mayangsari, A., Wijaya, R. A., & Mufid, A. (2024). Analisis Faktor Yang Memengaruhi Produksi Usahatani Kunyit di Desa Bandilan Kecamatan Prajekan Kabupaten Bondowoso. Mimbar Agribisnis: *Jurnal Pemikiran*

Masyarakat Ilmiah Berwawasan Agribisnis, 10(2), 3489-3495. doi: 10.25157/ma.v10i2.14899

Megasari, K., Yunita, R., & Swantomo, D. (2019). Studi Komparasi Penggunaan Kunyit Dengan Iradiator Sebagai Pengawet Tahu Dengan Pendekatan Life Cycle Assessment. *In Jurnal Forum Nuklir*, 13(2), 55-62. Retrieved from https://jurnal.batan.go.id/index.php/jfn/article/view/5709

Mustofa, N. A. (2016). Analisis Faktor-Faktor Yang Mempengaruhi Poduksi Dan Pendapatan Usahatani Kunyit (*Cucurma longa L*) Studi Kasus Si Desa Pelem Kecamatan Bungkal, Kabupaten Ponorogo, (Thesis, Agribisnis, Fakultas Pertanian Universitas Brawijaya, Indonesia). Retrieved from https://repository.ub.ac.id/id/eprint/131554/

Nurchaini, D. S., Damayanti, Y., & Ulma, R. O. (2020). Optimalisasi Penggunaan Faktor Produksi Pada Usaha Tani Kakao Di Kecamatan Kumpeh Kabupaten Muaro Jambi. *Jurnal AGRISEP: Kajian Masalah Sosial Ekonomi Pertanian Dan Agribisnis*, 19(02), 331-346. doi: 10.31186/jagrisep.19.2.331-346

Nurlina, N., Adnan, A., & Safrizal, S. (2019). Pemanfaatan Lahan Pekarangan Dalam Meningkatkan Pendapatan Keluarga Pada Desa Blang Batee Kabupaten Aceh Timur. *Global Science Society: Jurnal Ilmiah Pengabdian Kepada Masyarakat*, 1(1), 97-107. Retrieved from https://ejurnalunsam.id/index.php/gss/article/view/1164

Pradnyawati, I. G. A. B., & Cipta, W. (2021). Pengaruh Luas Lahan, Modal Dan Jumlah Produksi Terhadap Pendapatan Petani Sayur Di Kecamatan Baturiti. Ekuitas: *Jurnal Pendidikan Ekonomi*, 9(1), 93-100. doi: 10.23887/ekuitas.v9i1.27562

Pramudyo, Adi. (2018). *Budidaya dan Bisnis Jahe, Lengkuas, Kunyit dan Kencur*. Jakarta: PT AgroMedia Pustaka

Puspitaningsih, D. (2020). Strategi Pengembangan Agribisnis Komoditas Kunyit Kuning Di Kabupaten Gresik (Doctoral Dissertation, Wijaya Kusuma Surabaya University, Surabaya, Indonesia). Retrieved from https://erepository.uwks.ac.id/6656/

Risdalia, R., Tangkesalu, D., & Sulmi, S. (2020). Analisis Pendapatan Usahatani Kedelai Di Desa Lariang Kecamatan Tikke Raya Kabupaten Mamuju Utara. *Agrotekbis: Jurnal Ilmu Pertanian*, 8(4), 836-840. Retrieved from http://jurnal.faperta.untad.ac.id/index.php/agrotekbis/article/view/795

Santoso, I., et al. (2023). Pemberdayaan BUMDesma Sari Bumi dalam Peningkatan Nilai Tambah Simplisia Kunyit Kualitas C. *Jurnal Kolaboratif Sains*, 6(8), 935-941. doi: 10.56338/jks.v6i8.3747

Sekertawi. (1994). *Teori Ekonomi Produksi dengan Pokok Bahasan Analisis Fungsi Cobb Douglas*. Jakarta: Raja Grafindo Persada

Shaleha, R. R. (2022). Tingkat Pengetahuan Masyarakat Tentang Penggunaan Tanaman Herbal Sebagai Salah Satu Pencegah Covid-19. *Journal of Pharmacopolium*, 5(1), 1-9. doi: 10.36465/jop.v5i1.877

Siadari, M., & Saragih, M. R. (2022). Faktor-Faktor Yang Mempengaruhi Pendapatan Usaha Tani Kunyit. *Jurnal Media Ilmu*, 1(1), 95-106. doi: 10.31869/mi.v1i1.3872

Sinaga, P., & Mimy, M. P. (2023). Potensi Hasil Hutan Bukan Kayu (HHBK) Unggulan Di Kabupaten Timor Tengah Selatan, Provinsi Nusa Tenggara Timur. *Journal Of Scientech Research And Development*, 5(1), 663-672. doi.org/10.56670/jsrd.v5i1.163

Suratiyah, K. (2015). *Ilmu Usahatani*. Jakarta: Penebar Swadaya

Teken, I. B & Asnawi, S. (1977). *Teori Ekonomi Mikro*. Bogor: Institut Pertanian Bogor

Turukay, M. (2023). Efisiensi Pemasaran Kunyit (*Curcuma domestica*) (Kasus di Pulau Kelang Kecamatan Huamual Belakang Kabupaten Seram Bagian Barat, Provinsi Maluku). *Innovative*: *Journal Of Social Science Research*, 3(4), 819-830. doi: 10.31004/innovative.v3i4.3587

Wardani, M. K., & Nurhayati, C. (2023). Analisis Problematika Petani Kunyit Madura dan Alternatif Solusi. *Jurnal Ilmiah Membangun Desa Dan Pertanian*, 8(1), 29-36. Retrieved from http://ejournal.agribisnis.uho.ac.id/index.php/JIMDP/article/view/43

Widaryanto, E., & Azizah, N. (2018). *Perspektif Tanaman Obat Berkhasiat: Peluang, Budidaya, Pengolahan Hasil, Dan Pemanfaatan*. Malang: Universitas Brawijaya Press

Yosifani, D. Y., Satriani, R., & Putri, D. D. (2021). Nilai Tambah Kedelai Menjadi Tahu Kuning Dan Faktor-Faktor Yang Memengaruhinya. *Jurnal SEPA*, 18(1), 101-111. doi: 10.20961/sepa.v18i1.47688