ANALYSIS OF TECHNICAL EFFICIENCY OF GINGER COMMODITY FARMING IN WONOGIRI DISTRICT

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ABSTRACT

Wonogiri Regency, located in Central Java Province, is the main center of ginger production in Indonesia with total production reaching 6,851,216 kg in 2019. Ginger, which consists of three main types: elephant ginger, emprit ginger, and red ginger, has high economic value as food ingredients, beverages, spices, and herbal medicines. This study aims to analyze the technical efficiency of ginger farming in Wonogiri Regency. The method used is technical efficiency analysis with the Technical Efficiency Level (TER) indicator, which shows that ginger farming in this area is not yet technically efficient. Factors affecting efficiency include seed quality, rhizome health, and farm environmental conditions. The results indicate the need for improvements in the use of production inputs to increase the efficiency and productivity of ginger farming, which in turn can increase farmers' income and support the sustainability of the ginger industry in Wonogiri Regency.

KEYWORDS

Technical Efficiency, Ginger Farming, Wonogiri Regency, Seed Quality, Agricultural Production, Sustainable Agriculture.

INTRODUCTION

Ginger is a major biopharmaceutical commodity in Indonesia. Indonesia's highest ginger production from 2018 to 2020 was 224,447,501.8 kg per year, according to Indonesia's Central Bureau of Statistics (BPS). Turmeric production amounted to 164,811,794 kg per year and cardamom amounted to 85,135,206.8 kg per year. Indonesia has a fertile climate, abundant resources, and ideal geographical conditions, which can result in high levels of ginger production. With average rainfall throughout the year, Indonesia's tropical climate is also suitable for ginger cultivation. The three most commonly recognized types of ginger in Indonesia are large white ginger (also known as elephant ginger), small white ginger (also known as emprit ginger), and red ginger. This biopharmaceutical crop has good opportunities in the domestic and international markets, as ginger has a very high value and many health benefits. In 2022 Indonesia produced 247.34 thousand tons of ginger. Indonesia's ginger production has undergone changes over the past ten years due to the trend, according to data from Indonesia's Central Bureau of Statistics (BPS). In 2022, ginger production decreased by 19.49% from the previous year, to 307.24 thousand tons, but in 2021 ginger production increased significantly as an alternative treatment and to increase endurance during the COVID-19 pandemic (Wahyuni et al., 2023).

Ginger is one of the most important ingredients for the food, beverage, and medicinal industries. Ginger is a type of rhizome that is usually grown and used for cosmetics, seasoning, food or beverage mixtures, spa ingredients, and export products. The development of traditional medicine and industrial-scale industries has increased the demand for ginger, showing promising prospects for the future development of ginger farming. During the COVID-19 pandemic, demand for ginger in Indonesia increased rapidly, as many people sought natural methods to boost their immune systems. As people shift to a more natural lifestyle, they believe that consuming herbal medicine has almost no side effects compared to chemical drugs which impacts the demand for traditional medicine, increasing market opportunities for biopharmaceutical products. Data from Indonesia's Central Bureau of Statistics (BPS) 2021 shows that the harvest area of ginger in 2020 decreased from the previous year. The harvest area of ginger in 2020 was 7,403.6 Ha which decreased to 8,076.6 Ha indicating that the supply of ginger is lower than the demand. Ginger exports in Indonesia amounted to 2,370.47 tons compared to imports of 19,252.7 tons in 2020. Indicating that the deficit balance is dominated by ginger commodities. This imbalance causes problems for the ginger commodity market, especially during the COVID-19 pandemic (Lestari et al., 2022).

Wonogiri Regency is one of the regencies in Central Java Province that is the center of the highest ginger production. In 2019 Wonogiri Regency became the number one center in Central Java Province with ginger production of 6,851,216 kg. The ginger plant has three types, namely large ginger (elephant ginger), small ginger (emprit ginger), and red ginger. The three types of ginger are one of the biopharmaca plants that have prospects in the domestic and international markets. The value of ginger lies in its rhizome, which can be consumed as food, warming drink, spice, and herbal medicine. Ginger cultivation in Wonogiri Regency has become one of the sources of livelihood for the local community to increase farmers' income. Based on data from BPS Wonogiri Regency in 2020, ginger production has decreased, in 2020 production was 5,485.786 kg, in 2021 production was 1,382.557 kg and in 2022 production was 3,165.683 kg. The decrease in production is due to a decrease in land area so that it can affect ginger productivity. The land area in 2020 was 2,438.869 m^2, in 2021 it decreased to 819.657 m^2 and in 2022 it was 2,366.918 m^2. This is due to various factors, such as land conversion, reduced interest in ginger cultivation, and other factors. The decline in production is influenced by the lack of inputs used by farmers, the use of poor seeds, and maintenance that is not maximized.

The decline in ginger production has resulted in large fluctuations while ginger exports remain stable. The problems faced by ginger farmers in Wonogiri Regency are fluctuations in yields that are erratic and prices that remain stable so that farmers get little profit. The solution to keep production increasing every year is to reassess the Technical Efficiency Analysis of Ginger Commodity Farming in Wonogiri Regency with the aim that farmers feel the maximum results.

RESEARCH METHOD

Place and Time of Research

This research was conducted for 4 months from April to July 2024, the method of taking locations was purposive or deliberate based on certain considerations in Kismantoro District, Bulukerto District and Slogohimo District of Wonogiri Regency.

Data Type and Source

The types of data used in the research analysis of factors affecting the efficiency of ginger farming in Wonogiri Regency include primary data and secondary data:

1. **Primary data**

Primary data collected from interviews with respondent ginger farmers include characteristics of ginger farmers (age, education, gender, farming experience), production factors (ginger crop production, type of ginger seeds, amount of land ownership and labor) (Sari, 2021).

2. **Secondary data**

Secondary data is a source of data that can be obtained indirectly in the form of records or reports that already exist, both published and unpublished and literature from journals, manuals or libraries. This research is a secondary data source, namely the Wonogiri Regency Central Statistics Agency (BPS), in the form of ginger farmer data (Yusri, 2018).

Data Collection Technique

a. Interview is a method of collecting data through in-depth questions and answers related to the research. Interviews were conducted with farmers in Wonogiri Regency as respondents using a list of questionnaire questions related to ginger farming management. The interview method was used to obtain primary data.
b. Recall is a method of remembering and recording the necessary data over a period of time. The recall method aims to obtain primary and secondary data.
c. Documentation is data collection carried out through data archives related to research problems so that it can complement the information already obtained in the field. Documentation is obtained from records, existing reports, recordings and so on that support the implementation of research. The documentation method aims to obtain secondary data in the form of existing records and reports.

Population and Sample

The population in this study is ginger farmers in Wonogiri Regency, the population size is unknown. The sample was ginger farmers in Wonogiri Regency. The location was chosen purposively based on the declining ginger productivity in Wonogiri Regency. Researchers took three sub-districts with the highest production in Wonogiri Regency, namely Kismantoro District, Bulukerto District, Slogohimo District.

Data Analysis Method

Data processing was done using tabulation of the results of the questionnaire. The data analysis method used in this study uses the analysis of technical efficiency of ginger ginger farming in Wonogiri Regency. To determine the technical efficiency of ginger farming in Wonogiri Regency, researchers used the following analysis.

$$\text{TER} = \text{TER} = \frac{Y_i}{Y}$$

Notes:

TER = Technical Efficiency Level
Y = Potential Production
Yi = Actual Production Criteria

Technical efficiency criteria (Amir et al., 2022):

1. A farm is said to be efficient in using production inputs if it has a technical efficiency value of 1.
2. A farm is said to be inefficient in using production inputs if it has a technical efficiency value of less than 1.
3. A farm is said to be inefficient in using production inputs if it has a technical efficiency value of more than 1.

RESULT AND DISCUSSION

Based on the results of research by conducting interviews with questionnaires and recall data to ginger farmers in Wonogiri Regency by using technical efficiency analysis of farming to determine whether ginger farming in Wonogiri Regency is technically efficient or not. Researchers analyzed using technical efficiency analysis as follows:

Technical Efficiency Analysis using Indicator TER = $\frac{Y_i}{Y}$

The measurement of technical efficiency is the result of the determination of data processing using the indicator TER=$\frac{Y_i}{Y}$. Based on the idea that a high level of efficiency will be profitable because technical efficiency cannot be separated from the ideal combination of production factors. Calculating the value of technical efficiency is one way to find out how effective the use of production factors in ginger farming (Sulistyaningsih & Waluyati, 2019). Technical efficiency is a measure of how much a farmer can convert inputs into outputs at a given level of production, economic factors, and technology. The technical efficiency of ginger farms in Wonogiri Regency can be seen in Table 1.

Table 1. Results of Technical Efficiency Analysis with Indicator TER=$\frac{Y_i}{Y}$

Average Technical Efficiency of Ginger Farming			
Average (Yi/Y)	**Number of Respondents**	**Percentage %**	**Criteria**
1,86	5	5.20	Efficient
0,29	91	94.80	Non-efficient
In total	96	100	

Source: Primary Data Processed 2024

Based on Table 1 shows that the technical efficiency value of the analysis results which is more than 1 is considered efficient while less than 1 is considered inefficient for business. The average value of technical efficiency is 1.86 as many as 5 respondents with a percentage of 5.20% declared efficient because the value of technical efficiency is more than 1 and the average value of technical efficiency is 0.29 as many as 91 respondents with a percentage of 94.80% declared inefficient because the value of technical efficiency is less than 1, then ginger farming in Wonogiri Regency is declared not technically efficient because there are still many respondents less than the efficient value of the indicator 1. Based on the data obtained, the overall use of ginger farming inputs in Wonogiri Regency carried out by respondents is not or not technically efficient. Factors that influence ginger farming in Wonogiri Regency are not technically efficient, among others:

1. **Seed quality**

   The quality of seeds used by ginger farms in Wonogiri Regency is not suitable or good enough for planting. Factors affecting the quality of elephant ginger, red ginger and emprit ginger seedlings and the risk of crop failure are the health of the seedling rhizomes must be free from disease and physical damage, rhizomes infected with fungi or bacteria can cause plants to not grow well, seedlings with rhizome sizes that are too small may not have enough nutrient reserves to grow optimally. The environment affects the growth of ginger plants such as soil that lacks nutrients, poor drainage can inhibit growth. In terms of climate and weather, ginger plants need warm temperatures and sufficient humidity, high temperatures or drought can interfere with growth. To increase ginger production in Wonogiri Regency, ginger farmers must choose quality seedlings that are healthy, not deformed, and not sick, usually 9 to 12 months old. Before planting, make sure the seedlings are stored in a dry place and protected from sunlight. Make sure the soil

used is fertile, loose, and easily drained and the planting distance between seedlings also needs to be considered so that it is not too tight so that ginger plants can absorb a lot of nutrients and make ginger plants grow well.

According to Bambang Pujiasmanto *et al,*. (2021), the quality of ginger seedlings that are not good for planting is usually characterized by small rhizome size, pale color, and signs of disease or physical damage such as black spots or rot. In contrast, good ginger seedlings have large and healthy rhizomes, are brightly colored, and free from disease. One of the best known ginger seed varieties is Jahe Gajah, which has a large rhizome size, strong aroma, and high essential oil content, making it ideal for planting.

2. Fertilizer availability

Ginger farmers in Wonogiri Regency often face problems with fertilizer availability, including farmers often facing problems in obtaining quality fertilizer. The absence of fertilizer supply in some areas of Wonogiri Regency due to uneven distribution, high prices small farmers face challenges due to high fertilizer prices. Final fertilizer prices in the market are often influenced by raw material prices and transportation costs, fertilizers available in the market do not meet the required quality standards, can damage crops and experience reduced yields if counterfeit or low-quality fertilizers are used. Dependence on chemical fertilizers, excessive use of chemical fertilizers without the use of sustainable agricultural methods can lead to long-term decline in soil fertility. Good maintenance for ginger plants is to fertilize with organic fertilizer or manure regularly. Make sure to water adequately, but do not let the water stagnate, as it can cause ginger plants to rot easily. To achieve this, an integrated approach should be used, which includes the use of organic fertilizers, lack of knowledge and information Many farmers do not know the right type of fertilizer for ginger, the right dosage, and the right application time, this can lead to ineffective fertilizer use and crop yields cannot cover the initial inputs incurred by ginger farms in Won District.

According to Hapsoh *et al*., (2022) For optimal growth and high yields, good fertilizers are needed for ginger plants. Here are some types and characteristics of composted organic fertilizers that are good for ginger plants, containing organic matter that improves soil structure, increases the soil's ability to retain water, and provides nutrients gradually. Green manure, ground cover crops such as legumes composted on the ground can add organic matter and nitrogen to the soil. manure is a good source of nitrogen and helps improve soil fertility. Nitrogen (N) chemical inorganic fertilizers are necessary for leaves and stems to grow properly. A good source of nitrogen is fertilizer containing urea or ammonium sulfate, phosphorus (P) is essential for rhizome and root development, farmers can use fertilizer containing superphosphate or diamonium phosphate.

3. Lack of technology and counseling or training

There is still a lack of training and counseling for ginger farmers in Wonogiri Regency from the agriculture office or the Agricultural Extension Agency (BPP) in knowledge about weather factors, pests, plant diseases that can have an impact on production and agricultural practices that are less than optimal due to poor management, organization and farm planning. The inhibitor of the technical efficiency of ginger farming in Wonogiri Regency is in the marketing of production which is influenced by the distribution of poor market access and limited market access resulting in farmers' output has not reached the input spent on their farms.

According to Novitaningrum *et al,*. (2002), differences in mastery and application of technology indicate that farmers have different levels of technical

efficiency. Differences in farmers' level of technology mastery are caused by internal and external factors, such as education, age, farming experience, and frequency of attending extension services, as well as external factors, such as seasonality. Educational extension and training programs, providing extension programs that focus on the use of technology in agriculture, and providing farmers with practical training. Cooperation with educational institutions in providing farmers with technology training. Financial support from government subsidies and assistance The government can provide subsidies or financial assistance to purchase agricultural technology equipment. Access to credit gives farmers more access to credit services that offer low interest for technology purchases. Improved policies and supporting programs The government creates policies that support the adoption of agricultural technologies, including providing incentives to farmers who use advanced technologies. Government programs launch programs to encourage the use of technology in the agricultural sector.

CONCLUSION

Based on the results of the technical efficiency analysis, ginger farming in Wonogiri Regency is not technically efficient because it still faces various obstacles, such as the poor quality of ginger seeds, the availability of quality fertilizers, the lack of knowledge of farmers about good ginger cultivation practices, the use of agricultural technology that is less than optimal, and limited access to modern agricultural facilities and infrastructure. This has resulted in the production of ginger in Wonogiri Regency not being maximized, as well as relatively high production costs.

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