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THE EFFECT OF HARVEST PRODUCTIVITY AND RICE HARVEST PRICES ON THE WELFARE LEVEL OF FOOD CROP FARMERS IN EAST JAVA 2014-2024

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Abstract :

Agriculture is a strategic sector for Indonesia's economy, and East Java is a major contributor to national rice production due to its large harvested area and high productivity. However, farmer's welfare remains relatively stagnant, reflected in the Farmer's Term of Trade Indeks (NTP) which has only ranged between 100-105 during 2014-2025. This study aims to analyze the effect of harvest productivity and rice harvest prices on the welfare level of food crop farmers in East Java. This research using a quantitative approach and data analysis was carried out using multiple linear regression with harvest productivity, rice harvest prices, and the NTP as indicators of farmer's welfare. The data used is secondary time series data for the period 2014-2024 from the East Java Central Bureau of Statistics (BPS). The results indicate that both rice harvest productivity and rice harvest price have a positive but not signifficant effect on farmer's welfae. The coefficient of determination (Adjusted R^2) of 0.260 shows that only 26% of variations in farmers' welfare can be explained by these two variables, while 74% are influenced by other factors. These findings suggest that increases in yield and market prices have not yet been able to significantly improve farmers' welfare and are contrary to the Islamic economic perspective, which emphasizes fair distribution of value and benefits. This study recommends the need for agricultural policy interventions that are fair, sustainable, and in line with Islamic economic principles.

Keywords : *harvest productivity, rice harvest price, farmer welfare, Farmer's Term of Trade Index (NTP)*

INTRODUCTION

Agriculture is a strategic sector for the Indonesian economy. The Central Statistics Agency (BPS), through a publication from the Ministry of Agriculture (2025), stated that agriculture was the highest contributor to Gross Domestic Product (GDP) in the first quarter of 2025, at 10.52%. In 2024, the agricultural production index showed a slight increase of 1.2 points compared to 2023, from 192.82 to 194.02. Furthermore, the agricultural sector contributed 12.61% to GDP at Current Prices in 2024, an increase of 0.08% from the previous year, with the food crops sector contributing 2.19% of the total contribution

(BPS, 2025). In terms of productivity, BPS stated that East Java Province is the largest contributor to Indonesia's food barn, contributing 17.442% to national rice production. This achievement is supported by a rice harvest area of 1.6 million hectares and a production target of 9.27 million tons of dry milled grain (GKG) (Ministry of Agriculture, 2025). However, farmer welfare remains volatile and tends to stagnate.

Well-being describes the level of satisfaction a person derives from using the income they receive. It is relative in nature because it depends on the level of satisfaction they feel from consuming that income (Ginoga et al., 2022). One indicator of family well-being can be seen in through the amount of household expenditure, which includes food and non-food needs, including various goods and services (Hasbiadi et al., 2022). Meanwhile, Razi & Wahyuni (2022) define farmer welfare as the ability of farmers to meet basic family needs such as food, clothing, shelter, welfare, and education. Farmers are considered prosperous if these needs can be met properly, while the inability to meet them indicates that farmers are not yet prosperous (Islam et al, 2023). One way to assess the level of farmer welfare is by looking at the amount of income and its compatibility with household expenditures. A commonly used indicator is the Farmer Exchange Rate (NTP) (Tenriawaru et al., 2021).

The Farmer Exchange Rate (NTP) is defined as the ratio between the price index received by farmers and the price index paid by farmers, expressed as a percentage. In 2024, Indonesia's national NTP was 119.62, while the national NTP for the food crops subsector was 110.45 (BPS, 2024). Then, as of April 2025, the national NTP was 121.06, while the national NTP for the food crops subsector was 106.51 (BPS, 2025). This condition indicates that the level of farmer welfare in Indonesia continues to fluctuate nationally and tends to stagnate (Ulfah et al, 2022). The higher the NTP, the greater the farmer's capacity to meet consumption needs and obtain production inputs. Thus, an increase in the NTP indicates an improvement in farmer welfare, while a decrease reflects a worsening of that welfare (Tenriawaru et al., 2021).

The Farmer's Exchange Rate (NTP), as an indicator of farmer welfare, reflects farmers' purchasing power and economic position in response to changes in crop and input prices (Min et al., 2023). Farmers' welfare is reflected in the purchasing power they achieve through the income they earn to meet household needs. When farmers' incomes increase to cover consumption needs, the farmer's exchange rate, as an indicator of welfare, also increases. Thus, farmers can be said to be in a more prosperous condition (Aulia et al., 2021).

Rice is the food crop with the largest production volume compared to other food commodities, considering that rice remains the main staple food for the Indonesian population (Jepri et al., 2024). In East Java alone, the rice harvest area in 2024 reached 1.62 million hectares with a total production of 9.27 million tons of dry milled grain (GKG). Conversion into rice for population consumption reached 5.35 million tons (BPS East Java, 2025). However, rice productivity in several key regencies such as Ngawi, Lamongan, and Bojonegoro experienced a decline of 8–12% due to the long dry seasons in 2019

and 2023 (BPS East Java, 2023).

For farmers, productivity is a crucial factor in achieving their success. This is because increased productivity will increase farmers' income, thus impacting their welfare (Purnomo & Savikri, 2021). In the context of rice farming, productivity is determined by the area of rice harvested, which in turn influences total rice production (Raj, 2025). The size of the land owned by farmers determines the amount of production that can be achieved; the larger the area managed, the greater the potential rice production. Therefore, the scale of land is a key determinant of the level of farm output (Aryani et al., 2025). Similarly, it influences the level of farmer welfare. One cause of unstable rice farmer welfare is fluctuations in harvest yields and grain prices, which are influenced by various factors, such as climate change, pest attacks, irrigation water availability, and market dynamics (Khasanah & Gunanto, 2024).

Previous studies have shown that crop productivity, measured by land area and total production, has a significant and positive impact on farmer welfare based on income levels (Nurhapsa et al., 2021; Razi & Wahyuni, 2022). Meanwhile, Daulika et al. (2026) suggest that low productivity leads to low NTP. Purnomo & Savikri (2021) also found that increased productivity negatively impacts farmer welfare. This indicates that increased mass production can lead to oversupply and declining market prices. Thus, crop productivity has been shown to impact farmer welfare, but its success is heavily influenced by market conditions and pricing policies (Shobur et al., 2025).

The selling price of the harvest is also a determining factor affecting farmer welfare through fluctuations in the NTP. This is due to the role of price components in shaping the exchange rate of both revenue and income (Jepri et al., 2024; Purnomo & Savikri, 2021; Razi & Wahyuni, 2022). In the context of rice farming, harvest prices are generally divided into farm-gate prices and mill-gate prices. Farm-gate prices are the selling price determined through a transaction agreement between the farmer and the buyer on the day of observation, with the grain in its original condition (Taufil & Agustiani, 2025). Meanwhile, mill-gate prices are the farm-gate prices plus costs associated with the transportation process or other additional costs required to transport the grain to the nearest milling unit. Grain prices often fluctuate sharply; for example, the price of dry harvested grain (GKP) fell from IDR 5,500/kg in March 2022 to IDR 4,600/kg in August 2022, before rising again the following year. In 2024, the average price of unhusked rice at the farmer level in East Java ranged from Rp 5,284.44 to Rp 7,688.13 per kilogram of harvested dry unhusked rice (GKP) (BPS East Java, 2025). This fluctuation directly impacts farmers' income and purchasing power, given that the majority of their income still relies on one primary commodity: rice.

The Farmer's Exchange Rate (NTP) is calculated by comparing the price index received by farmers with the price index they must pay. The price index received by farmers reflects the dynamics or changes in commodity prices produced by farmers (Tenriawaru et al., 2021). Ginoga et al. (2022) stated that the selling price of an agricultural commodity has a positive effect on farmer

welfare. In the context of rice farmers, Rahman et al. (2023) also stated that the price of unhusked rice has an impact on the welfare of rice farmers. Furthermore, Saridewi (2021) and Jepri et al. (2024) found that crop prices have a positive and significant effect on the NTP. However, research by Aulia et al. (2021) shows a difference of opinion that commodity prices have a negative and significant effect on the NTP in the long term. This creates a paradox about how rising agricultural product prices can be detrimental to farmers (Munandar et al, 2024). This condition indicates that commodity prices do influence farmers' welfare, but can have a negative impact and be influenced by broader factors (Fahmid et al., 2022).

Based on these findings, it shows a contradiction in the influence of prices and yields of agricultural commodities on farmer welfare. The existence of different empirical findings, the uncertainty of the impact of rice yields and prices on farmer welfare, and the strategic position of East Java as a major supporter of national food production, encourages this research to be conducted to provide a more comprehensive and data-based understanding of the factors that influence the welfare of rice farmers in East Java, so that it can serve as a basis for formulating more effective and sustainable agricultural policies.

RESEARCH METHOD

This research uses a quantitative approach with analysis using multiple linear regression. Multiple linear regression was used to determine the relationship between these variables (Indartini & Mutmainah, 2024). The variables used in this study consist of a dependent variable (Y) and an independent variable (X). The dependent variable is the level of welfare of food crop farmers in East Java based on the Farmer Exchange Rate (NTP) index, while the independent variables are rice harvest productivity (tons/ha) (X1) and rice harvest price (rupiah per harvested dry grain) (X2) in East Java. The type of data used is secondary data in the form of quantitative time span *(time series)*. The data source comes from the publication of the Central Statistics Agency of East Java Province regarding the results of rice harvest productivity and the Farmer Exchange Rate (NTP) throughout 2014-2024. Data analysis uses the SPSS 26 application program to determine the effect of rice harvest productivity and harvest prices on the welfare level of food crop farmers in East Java. The data analysis carried out includes classical assumption tests (normality test, multicollinearity test, heteroscedasticity test, autocorrelation test), multiple linear regression test, and data interpretation (Kamil et al, 2023). Systematically, the research framework and hypotheses are formulated as follows:

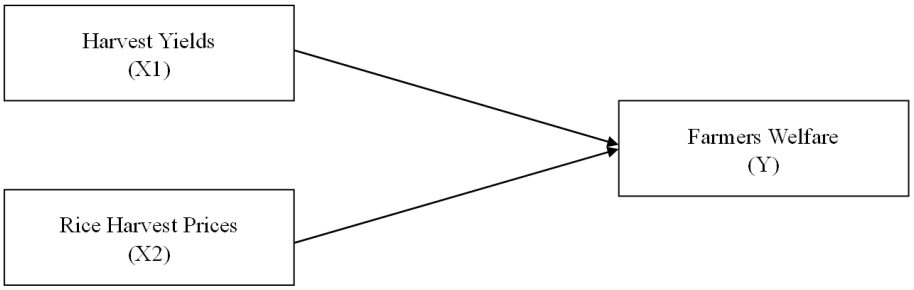

Figure 1 : Research Framework

Hypothesis:

H_0 : Harvest yields and average rice harvest prices simultaneously do not have a significant effect on the level of farmer welfare.

H_1 : Harvest yields and average rice harvest prices simultaneously have a significant effect on the level of farmer welfare.

$H_{2\text{-}0}$: Rice harvest yields (X1) do not have a significant effect on farmer welfare (Y).

$H_{2\text{-}1}$: Rice harvest yield (X1) has a significant effect on farmer welfare (Y).

$H_{3\text{-}0}$: Average Rice Harvest Price (X2) does not have a significant effect on Farmer Welfare (Y).

$H_{3\text{-}1}$: Average Rice Harvest Price (X2) has a significant effect on Farmer Welfare (Y).

RESULT AND DISCUSSION

Result

Multiple linear regression data analysis to determine the effect of rice harvest productivity (X1) and rice harvest prices (X2) on the level of farmer welfare (Y) was carried out using SPSS 26 software. The following are the results of the data analysis which includes classical assumption tests and multiple linear regression tests:

Classical Assumption Test

Normality Test

The normality test was conducted using the Kolmogorov-Smirnov method. The following are the results of the normality test using the Kolmogorov-Smirnov method:

Table 1: Normality Test Results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		11
Normal Parameters[a,b]	Mean	0.0000000
	Std. Deviation	5.10866387
Most Extreme Differences	Absolute	0.232
	Positive	0.232
	Negative	-0.162
Test Statistic		0.232
Asymp. Sig. (2-tailed)		0.100[c]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.

Based on the table above, it is known that the results of the Kolmogorov Smirnov normality test show a significance value (Asympt. Sig.) of 0.100 or > 0.05. According to Zahriyah et al. (2021), if the Kolmogorov-Smirnov test significance value is >0.05, the data is normally distributed. It can be concluded that the data used in this study are normally distributed.

Multicollinearity Test

The multicollinearity test is used to determine whether or not there is a linear relationship between independent variables. The following are the results of the multicollinearity test in this study using the VIF value (Variance Inflation Factor) And Tolerance:

Table 2: Multicollinearity Test Results

Variables	*Collinearity Statistics*	
	Tolerance	**VIF**
Rice Harvest Productivity (X1)	0.615	1.626
Average Harvest Price (X2)	0.615	1.626

Dependent Variable: Farmer Welfare (Y)

Based on the table above, the multicollinearity test results show that the VIF value for both independent variables is 1.626 (<10) and the Tolerance value is 0.615 (>0.1). Indartini & Mutmainah (2024) stated that if the VIF value is ≥10 or tolerance ≤0.10, the variable has a multicollinearity problem. It can be concluded that the variables in this study are free from multicollinearity symptoms because the VIF value is <10 and Tolerance >0.1.

Heteroscedasticity Test

The heteroscedasticity test is used to determine whether or not there is a correlation between the dependent variable and each independent variable. The following are the results of the heteroscedasticity test using scatterplot:

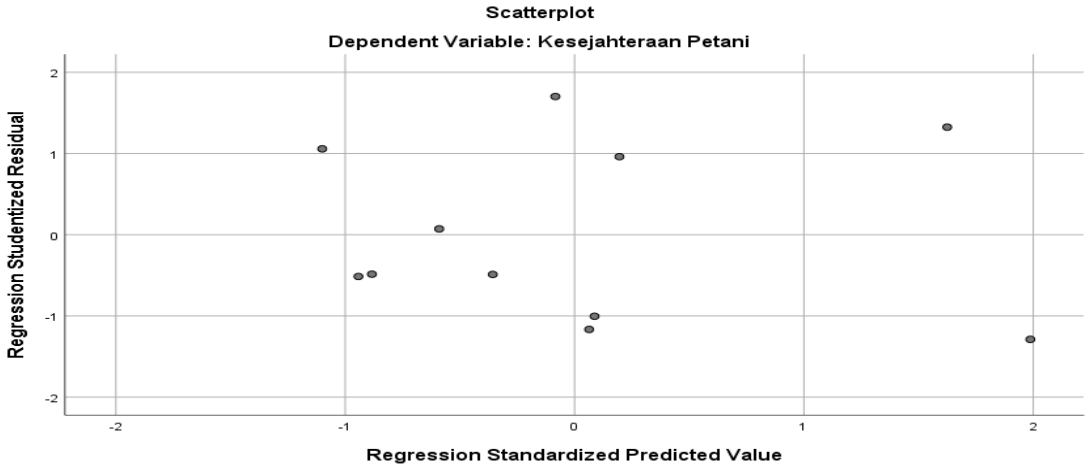

Figure 2 : Scatterplot Heteroscedasticity Test Results

Based on the image above, it is known that the points are spread above and below the number 0, and do not show any clear pattern. Indartini &

Mutmainah (2024) stated that a research model does not experience heteroscedasticity if there is no clear pattern and the points are spread above and below the number 0 on the Y axis. It can be concluded that this research model does not experience heteroscedasticity.

Autocorrelation Test

The autocorrelation test is used to determine whether or not there is an autocorrelation symptom due to the correlation between members of a series of observations ordered by time (time series) or according to space (cross-sectional). In this study, an autocorrelation test is necessary because the type of data used is time series. The following are the results of the autocorrelation test using the Durbin-Watson test method:

Tabel 3: Durbin-Watson Autocorrelation Test Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.639[a]	0.408	0.260	5.712	2.172

a. Predictors: (Constant), Average Harvest Price (X2), Rice Harvest Productivity (X1)

Dependent Variable: Farmer Welfare (Y)

Indartini & Mutmainah (2024) stated that the condition for no autocorrelation using the Durbin Watson test is if DU < DW < 4-DU. Based on the table above, it is known that the value of the Durbin-Watson (DW) test result is 2.172. Then, this study uses 2 (two) independent variables (K), the number of samples is 11 (N) and α = 5% (0.05), then the DU value is 1.6044. Then the result of the autorelation test is 1.6044 < 2.172 < 2.3956 which means that this research model does not experience autocorrelation.

Multiple Linear Regression Test

Multiple linear regression analysis is a linear relationship between two or more independent variables (X) and a dependent variable (Y). This analysis is used to determine the direction of the relationship between the independent and dependent variables, whether each independent variable has a positive or negative influence, and to predict the value of the dependent variable when there is an increase or decrease in the independent variable (Indartini & Mutmainah, 2024). The multiple linear regression equation in this study is modeled as follows:

$$Y = \beta + B_1X_1 + B_2X_2$$

with:

Y = Dependent Variable (Y) Level of Farmer Welfare
X_1 = Independent Variable (X1) Rice Harvest Productivity
X_2 = Variable Depends (X2) Rice Harvest Price
β = Constant
B = Regression coefficient

The following are the results of multiple linear regression analysis in this study:

Tabel 4: Results of Simultaneous Test (F Test) and Partial Test (t Test)

Model	Variables	F Test	t Test

		F	Sig.	t	Sig
Regression		2.756	0.123		
	Constant			1.502	0.171
	Produktivitas Panen Padi (X1)			0.433	0.677
	Harga Panen Padi (X2)			1.541	0.162
Dependent Variable: Farmer Welfare (Y)					
Predictors: (Constant), Rice Harvest Price, Rice Harvest Productivity					
R Square: 0,408					
Adjusted R Square: 0,260					

Based on the table, it is known that the coefficient of determination value(Adjusted R Square)The model's coefficient of correlation is 0.260. This value indicates that the independent variable has a 26% influence on the dependent variable. This means that the rice harvest productivity and rice harvest price variables can explain 26% of the variation in farmer welfare, with the remaining 74% influenced by factors outside the variables.

The simultaneous test (F test) is used to determine the simultaneous influence of the regression model. The table shows the significance values.(p-value)F test of 0.123 > 0.05 then H0accepted and H1rejected. This means that rice harvest productivity (X1) and rice harvest prices (X2) together (simultaneously) do not have a significant effect on the level of farmer welfare (Y).

The partial test (t-test), also known as the hypothesis test, is used to determine the partial effect of each independent variable on the dependent variable. Based on the table above, the results of the t-test are as follows:

1) The significance value of X1 against Y is 0.677 (>0.05), then $H_{2\text{-}0}$accepted and $H_{2\text{-}1}$rejected. This means that rice harvest productivity (X1) has a positive but insignificant effect on the level of farmer welfare (Y).
2) The significance value of X2 against Y is 0.162 (>0.05), then $H_{3\text{-}0}$accepted and $H_{3\text{-}1}$rejected. This means that the price of rice harvest (X2) has a positive but not significant effect on the level of farmer welfare (Y).

Tabel 5: Multiple Linear Regression Coefficients

Variables	*Unstandardized Coefficients*		*Standardized Coefficients*
	B	**Std. Error**	**Beta**
(Constant)	63.531	42.294	
Rice Harvest Productivity (X1)	0.390	0.901	0.150
Average Harvest Price (X2)	0.005	0.003	0.535
Dependent Variable: Farmers' Welfare (Y)			

Based on the table above, the multiple linear regression equation in this research model can be formulated as follows:

$$Y=63{,}531+0{,}390X_1+0{,}005X_2$$

with: Y = Level of Farmer Welfare

X_1= Rice Harvest Productivity

X_2= Rice Harvest Price

It can be concluded that:

1) The constant value of 65.531 means that if the variables X1 (Rice Harvest Productivity) and X2 (Rice Harvest Price) have a constant value of 0, then the level of Farmer Welfare will be at a basic value of 63.531 units.

2) The coefficient value of X1 is 0.390, meaning that every one-unit increase in rice harvest productivity, assuming other variables remain constant, will increase the level of farmer welfare by 0.390 units. It can be concluded that rice harvest productivity has a positive influence on farmer welfare. The higher the productivity, the higher the farmer welfare.
3) The X2 coefficient value of 0.005 means that every one unit increase in the Rice Harvest Price, assuming other variables remain constant, will increase the level of farmer welfare by 0.005 units. It can be concluded that the average harvest price has a positive but relatively small effect on farmer welfare, so that the increase in harvest prices only provides a very small increase in welfare.

Discussion

Based on the research results, data analysis revealed a positive effect of rice productivity and harvest prices on farmer welfare in East Java, as assessed through the Farmer Exchange Rate (NTP) for food crops. Rice productivity positively impacts farmer welfare in East Java. Higher productivity leads to higher farmer welfare. This finding aligns with findings by Nurhapsa et al. (2021) and Razi & Wahyuni (2022) that indicate that harvest productivity, derived from land area and total production, positively impacts farmer welfare. In general, increased productivity will also increase farmer income, thus impacting farmer welfare (Purnomo & Savikri, 2021).

Furthermore, rice harvest prices also have a positive influence on the welfare of farmers in East Java. This finding aligns with Rahman et al. (2023) finding that unhusked rice prices influence the welfare of rice farmers. This is further supported by the findings of Saridewi (2021) and Jepri et al. (2024) who stated that harvest prices have a positive influence on the NTP of food crop farmers. Although this tends to be a positive effect, the resulting value is relatively small, so that increases in rice harvest prices only provide a small increase in farmer welfare. Aulia et al. (2021) stated that this could be due to the possibility that harvest prices could negatively impact farmers' long-term purchasing power when agricultural input prices increase

However, the positive impact of rice productivity and harvest prices is insignificant, meaning it has not significantly improved farmer welfare. This can occur due to various factors. According to research by Aryani et al. (2025), the majority of farmers in Indonesia own small to medium-sized plots of land. Therefore, even though production and harvest prices increase, farmers' income remains relatively small. This low income limits the increase in farm income, which ultimately impacts farmers' welfare. Research by Zaman et al. (2024) also supports the findings, stating that increases in food crop commodity prices can indeed have a positive impact on increasing farmer income in the short term. However, in the long term, they are susceptible to decline, especially when inflation and production input prices increase. This condition indicates that changes in food crop commodity prices do not always improve the stability of the NTP as an indicator of farmer purchasing power and welfare. Furthermore,

research by Pratomo et al. (2023) also confirms that commodity price increases do not significantly impact farmer welfare if the increase occurs only at the final market level and is not enjoyed by farmers at the upstream level. It can be concluded that although productivity and harvest prices tend to encourage an increase in the welfare of rice farmers in East Java, the influence is not significant due to limited land area, low income at the farmer level, and the misalignment between increases in commodity prices and input costs which hamper the increase in NTP.

Research findings on the impact of rice productivity and harvest prices on the welfare of food crop farmers in East Java indicate an unequal distribution of value and limited economic benefits for farmers as primary producers. This contradicts the Islamic economic perspective on the principle of justice *('adl)* and benefit which demands fair and proportional distribution of income and equitable benefits for small producers such as farmers (Sistyamurti et al., 2024). Within the framework *maqashid sharia*, property maintenance *(ḥifẓ al-māl)*and benefit *(maṣlaḥah)* must be achieved in economic activities so that the benefits can be felt significantly and evenly by vulnerable groups (Marwah et al., 2025). A situation where increased productivity and harvest prices do not significantly improve farmer welfare indicates an inadequate market structure and an imbalance between increases in output prices and production costs. This condition indicates that the principle of equality has not been fulfilled, which emphasizes the importance of economic balance and sustainability in production activities (Mustofa et al., 2025). Research by Widodo et al. (2025) also explains that the state has a strategic role in ensuring that economic systems, such as in the agricultural sector, continue to run in harmony with goals through policy interventions that ensure justice, equitable distribution of economic value, and improved social welfare. Thus, the results of this study further emphasize the need for more equitable agricultural policy interventions oriented toward sustainable welfare in accordance with Islamic economic values.

CONCLUSION

The results of the study indicate that rice harvest productivity and harvest prices have a positive but insignificant effect on the welfare of food crop farmers in East Java during the 2014–2024 period. This finding indicates that increasing rice productivity and harvest prices has not been able to significantly improve the NTP and the welfare of food crop farmers. This condition is influenced by various structural factors, such as limited land area, value chain imbalances, price fluctuations that are unfavorable to producers, and high input costs that suppress farmer incomes. Several suggestions can be put forward based on the results of this study to improve farmer welfare in a sustainable manner, namely: 1) the need for policy interventions that are pro- and fair, such as a system for controlling grain prices at the farmer level and a reasonable floor price; 2) strengthening farmer institutions and optimizing Islamic economic instruments to encourage support for business capital and farmer

economic empowerment. Agricultural policies should be directed towards principles that emphasize balance, justice, and sustainability, not just increasing production or economic growth alone. Further research is recommended to add other variables related to farmer welfare based on the NTP, such as the farmer household expenditure index and the amount of production costs and additional capital goods.

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