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BUILDING FARMERS' ECONOMIC RESILIENCE: THE ROLE OF QUALITY SEEDS, FERTILIZERS, AND LAND SIZE IN INCREASING FARMERS' INCOME

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ABSTRACT

This study aims to analyze the role of quality seeds, fertilizers, and land size in increasing farmers' income, specifically in Kaway XVI District, West Aceh Regency. A quantitative method was employed, involving 96 randomly selected farmers as the sample. Primary data were collected through questionnaires, and the data were analyzed using multiple linear regression to evaluate the influence of each variable on farmers' income. The results revealed that quality seeds did not have a significant effect on farmers' income ($p = 0.488 > 0.05$), leading to the rejection of the first hypothesis (H1). In contrast, fertilizers had a significant impact on farmers' income ($p = 0.003 < 0.05$), supporting the second hypothesis (H2). Additionally, land size also significantly influenced farmers' income ($p = 0.000 < 0.05$), supporting the third hypothesis (H3). Collectively, the variables of quality seeds, fertilizers, and land size had a positive and significant influence on farmers' income. These findings provide new insights into the study of farmers' economic resilience, emphasizing the importance of optimizing fertilizer use and expanding land as key strategies to improve farmers' income. Furthermore, the role of quality seeds requires further evaluation to understand other factors that may affect their effectiveness. This study recommends policy interventions focused on improving farmers' access to quality fertilizers and efficient land management to support economic resilience in the agricultural sector.

Keywords: *Economic Resilience, Farmers' Income, Quality Seeds, Fertilizers, Land Size*

INTRODUCTION

The agricultural sector plays a strategic role in Indonesia's economy, particularly as a livelihood source for the majority of the rural population. However, low farmer income remains a major issue hindering economic development in rural areas, including in Kaway XVI District, West Aceh Regency. According to data from the Central Statistics Agency (BPS, 2024), the average income of farmers in this region is below the living wage, largely due to low agricultural productivity. Factors such as the use of quality seeds, suboptimal fertilization, and limited agricultural land size pose significant challenges that require further attention. Therefore, this study is essential to identify the role of quality seeds, fertilizers, and land size in increasing farmers' income and to provide data-driven solutions for improving their welfare.

Previous research has explored various factors affecting farmers' income. For instance, a study by Tanjung et al. (2020) demonstrated that using quality seeds could increase crop yields

by up to 30%, although its success heavily depends on the compatibility of seeds with soil and climate conditions. Similarly, Amfo & Ali (2020) emphasized the importance of developing adaptive local seeds to enhance crop yields across different regions. Additionally, Finger & El Benni (2021) highlighted that access to quality seeds remains a challenge for smallholder farmers due to limited distribution.

Fertilization has also been a central focus in numerous studies. Ceballos et al. (2020) found that optimal fertilization could increase agricultural yields by up to 40%. This finding was reinforced by Wang et al. (2023), who reported that effective fertilizer subsidies could boost productivity by 25% for small-scale farmers. Meanwhile, a study by Sapkota et al. (2021) underlined that integrating organic and inorganic fertilizers could result in more sustainable harvests. However, challenges related to fertilizer distribution and pricing remain significant barriers that need to be addressed.

Land size has long been identified as a major determinant of farmers' income. Rahmaniah et al. (2020) stated that farmers with land sizes exceeding two hectares tend to have double the income compared to those with smaller plots. A recent study by Brookes & Barfoot (2020) confirmed that optimizing land use through intercropping systems could increase productivity by 35%. This aligns with the findings of Sinaga et al. (2022), which showed that crop diversification on limited land could help boost farmers' income. Thus, while previous literature provides valuable insights, there is still a need for deeper studies on the combined impact of these factors.

Although prior studies offer critical insights into the factors influencing farmers' income, research on the interaction between quality seeds, fertilizers, and land size remains limited. Most existing studies tend to focus on each factor individually, leaving a gap in understanding how the combination of these factors can collectively contribute to income improvement. Additionally, research in specific regions like Kaway XVI, with its unique characteristics, is still scarce. Therefore, this study aims to fill the gap by providing a more comprehensive perspective.

This study seeks to examine the combined influence of quality seeds, fertilizers, and land size on farmers' income, focusing on rural areas such as Kaway XVI District. Using a quantitative approach based on multiple linear regression, the research provides new insights relevant to the agricultural sector. The findings indicate that fertilizers and land size significantly influence farmers' income, while quality seeds require further investigation to explore factors affecting their effectiveness. These results offer new directions for policy development emphasizing farmers' access to quality fertilizers and optimized land management. In addition to complementing existing studies, this research is expected to support farmers' economic resilience and contribute to the social sciences, particularly in understanding socio-economic dynamics in the agricultural sector. Through a multidisciplinary approach, the study provides practical and strategic recommendations for evidence-based policymaking that empowers farming communities in Kaway XVI and other regions with similar characteristics.

RESEARCH METHOD

This study employs a quantitative approach to examine the causal relationship between the variables of quality seeds, fertilizers, and land size on farmers' income. The quantitative approach was chosen because it allows for the systematic and objective analysis of numerical data, enabling generalizable results (Mohajan, 2020). The study involves three types of variables: dependent and independent variables. The dependent variable is farmers' income, measured in rupiah per hectare (Rp/ha). Meanwhile, the independent variables include (1) the use of quality seeds, referring to the quantity and type of seeds used by farmers in one planting season, (2) fertilizer use, encompassing the amount (in kilograms) and type of fertilizers applied, and (3) land size, referring to the area of farmland managed by farmers in hectares. The data used in this study includes information related to these three independent variables and farmers' income as the dependent variable.

Primary data serves as the main source of information in this research. Data collection was conducted through field surveys using structured questionnaires tested for validity and reliability (Walliman, 2021). The questionnaires were designed to gather data on the use of quality seeds, fertilizers, land size, and farmers' income. To ensure data accuracy, surveys were carried out using direct interviews with respondents (Bryman & Bell, 2015). The study involved 96 farmers selected randomly using the simple random sampling method. This technique ensures that every farmer in Kaway XVI District, West Aceh Regency, has an equal chance of being included in the sample, thereby enhancing the representativeness of the research findings (Karunarathna et al., 2024).

Data analysis was performed using multiple linear regression techniques. This method was chosen as it allows for the examination of the simultaneous influence of quality seeds, fertilizers, and land size on farmers' income. Before conducting regression analysis, the data was subjected to a series of classical assumption tests, including tests for normality, multicollinearity, and heteroscedasticity. The normality test ensures that the data follows a normal distribution, the multicollinearity test checks for strong correlations among independent variables, and the heteroscedasticity test examines the uniformity of error variances (Rusliana et al., 2023).

In this study, hypotheses were formulated to identify the effect of each independent variable, both individually and collectively, on farmers' income (Afroz, 2018). The first hypothesis (H_1) posits that quality seeds have a positive and significant effect on farmers' income. The second hypothesis (H_2) assumes that fertilizers also have a positive and significant effect on farmers' income. The third hypothesis (H_3) suggests that land size has a positive and significant effect on farmers' income. Additionally, a simultaneous hypothesis was formulated to test whether quality seeds, fertilizers, and land size collectively have a positive and significant effect on farmers' income. Data analysis was conducted using a significance level (α) of 0.05, which served as the threshold for determining whether the proposed hypotheses are accepted or rejected.

This study has several limitations. First, the research scope is limited to farmers in Kaway XVI District, so the findings may not be generalizable to other regions. Second, the measurement of data on quality seeds and fertilizers relies on respondents' reports, which may be subject to subjective bias. Third, the study does not include other variables such as government policies or the use of agricultural technology, which may also influence farmers' income. Therefore, the findings of this study should be interpreted with caution.

RESULTS AND DISCUSSION

Social and Economic Dimensions of Respondents

In this study, the majority of respondents were male, totaling 89 individuals (92.7%). This composition reflects the dominance of males in the agricultural sector, which is the focus of the research. Meanwhile, most respondents were within the age range of 30–40 years, amounting to 27 individuals (28.1%). This age group shows the active involvement of the productive generation in agricultural activities. In terms of education, the majority of respondents had a high school background, totaling 44 individuals (45%). This indicates that most of the main actors in the agricultural sector have a secondary education level. This is an important indication in understanding their accessibility to agricultural information and technology (Kansrini et al., 2021).

In terms of experience, most respondents had over 20 years of farming experience, totaling 56 individuals (58.3%). This long experience shows that the majority of respondents have expertise and practical skills honed over a long period. This experience can contribute to the effectiveness of implementing more innovative farming techniques (Clunies-Ross & Cox, 2023). The main occupation of the respondents was dominated by farmers and planters, totaling 30 individuals (31.3%). This shows that agricultural activities are the main livelihood for most respondents and also the primary source of income for their families.

Most respondents also owned agricultural land with an area between 10,000–20,000 m^2, totaling 45 individuals (46.9%). This land size reflects a significant land ownership pattern for medium-scale agricultural activities. Adequate land ownership can be a supporting factor in increasing agricultural productivity, as long as it is supported by proper management and technology (Sharma et al., 2022).

This study also provides an overview of the average income earned by the community from rice farming businesses. Based on the analysis results, the average income per harvest was Rp. 10,052,125, with an average total revenue of Rp. 11,957,021. The difference between revenue and income shows the operational costs incurred during the production process, such as costs for seeds, fertilizers, labor, and land maintenance. The average price of paddy obtained by farmers was Rp. 7,000 per kilogram, reflecting local market conditions during the research period. Meanwhile, the average production yield of rice farming per harvest was recorded at 1,708 kg. This production level provides an indication of land productivity and the efficiency of cultivation techniques applied by farmers.

The table below provides a more detailed description of the income and revenue components of rice farmers:

Table 1 Income of Rice Farmers in Kaway XVI Subdistrict

No.	Income Variable	Average
1.	Production Yield	1.708 Kg
2.	Paddy Price	Rp 7.000,-
3.	Revenue	Rp 11.957.021,-
4.	Income	Rp 10.052.125,-

Source: Primary Data Processed, 2024

From the data, it is evident that rice farmers in Kaway XVI Subdistrict have a relatively competitive income level, although it still depends on production yields and fluctuations in paddy prices. This income level can also be an important indicator in evaluating farmers' welfare and the potential to improve farming efficiency through technological and agricultural management innovations.

Foundation of Model Reliability: Normality, Multicollinearity, and Heteroscedasticity Tests

The reliability of the regression model in this study was tested through three classical assumption tests: normality test, multicollinearity test, and heteroscedasticity test. These tests aim to ensure that the model used is valid and can produce unbiased estimates. The normality test was conducted to ensure that the residual distribution of the regression model follows a normal distribution. Based on the analysis results using the One-Sample Kolmogorov-Smirnov Test, as presented in Table 2, the Asymp. Sig. (2-tailed) value of 0.704 is greater than the significance level of 0.05. This shows that the residual data is normally distributed. Therefore, the regression model used is feasible for hypothesis testing.

Table 2 Normality Test Results by One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		96
Normal Parameters[a,b]	Mean	0E-7
	Std. Deviation	1402064,23381007
Most Extreme Differences	Absolute	0,072
	Positive	0,041
	Negative	-,072
Kolmogorov-Smirnov Z		0,705
Asymp. Sig. (2-tailed)		0,704

a. Test distribution is Normal; b. Calculated from data

Source: Primary Data Processed, 2024

The multicollinearity test was conducted to detect the existence of strong linear relationships between independent variables in the regression model. The analysis results presented in Table 3 show that all independent variables have Tolerance values greater than 0.1 and Variance Inflation Factor (VIF) values less than 10. This indicates that there is no multicollinearity between the independent variables, so the regression model is not affected by this issue.

Table 3 Multicollinearity Test Results

Variable	Tolerance	VIF	Description
High-Yield Seeds	0,351	2,846	No multicollinearity detected
Fertilizers	0,975	1,026	No multicollinearity detected
Land Size	0,346	2,887	No multicollinearity detected

Source: Primary Data Processed, 2024

The heteroscedasticity test was the last step in testing classical assumptions to ensure that the residual variance is constant across the range of independent variable values. Based on the scatterplot results (Figure 1), the data points are randomly scattered around 0 without forming specific patterns, such as waves, widening-narrowing shapes, or clustering above or below the line. This pattern shows that the regression model does not experience heteroscedasticity.

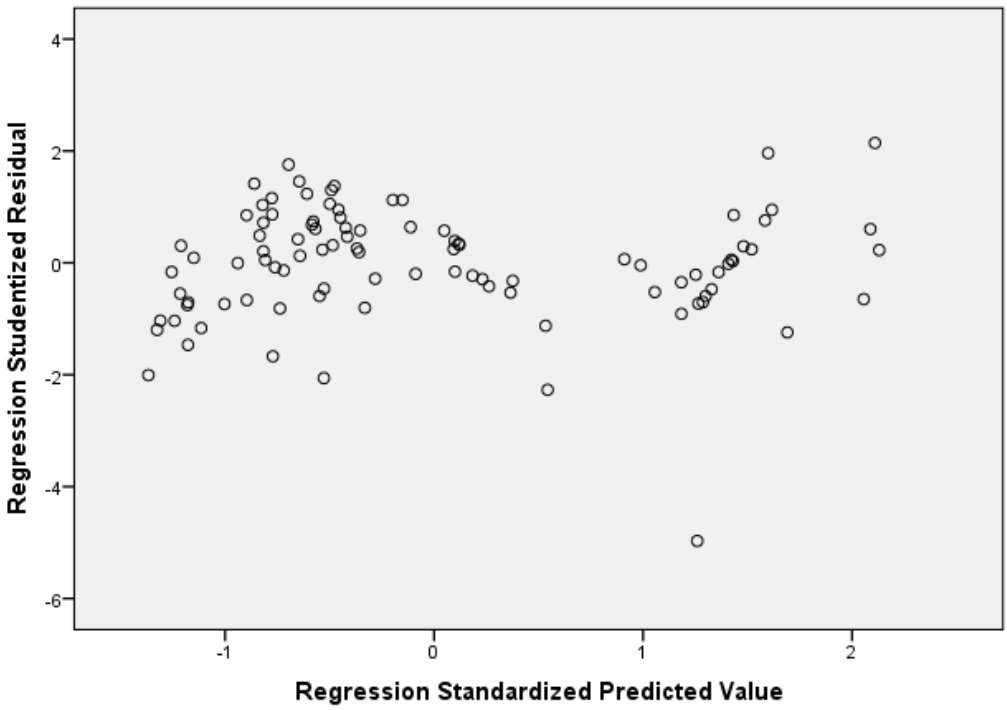

Figure 1 Heteroscedasticity Test Results “Scatterplot” Dependent Variable: Income
Source: Primary Data Processed, 2024

Based on these three tests, it can be concluded that the regression model in this study meets all classical assumptions. The residual data is normally distributed, there is no multicollinearity between independent variables, and the residual variance remains constant. This shows that the regression model is valid and reliable for hypothesis testing and further analysis.

Measuring Model Significance: Hypothesis Testing, Coefficient of Determination, and Model Feasibility

In measuring the significance of the research model, several testing methods were used: Multiple Linear Regression, Coefficient of Determination Test, Partial Test (t-test), and Model Feasibility Test (F-test). These tests aim to analyze the relationship between independent variables, namely high-yield seeds, fertilizers, and land size, and the dependent variable, which is farmers' income. Each method provides complementary insights to explain the influence of each independent variable both individually and collectively.

First, the results of multiple linear regression analysis yielded the following equation: $Y = 6247894{,}282 + 1{,}149X_1 + 0{,}780X_2 + 1653{,}700X_3 + \varepsilon$. This equation indicates that farmers' income (Y) is positively influenced by high-yield seeds (X_1), fertilizers (X_2), and land size (X_3). The constant of 6,247,894.282 indicates the farmers' income if all independent variables are valued at zero. The coefficient for high-yield seeds is 1.149, showing that every additional Rp 1 in high-yield seeds increases farmers' income by Rp 1.149. Meanwhile, the coefficient for fertilizers is 0.780, indicating that an additional Rp 1 in fertilizers increases farmers' income by Rp 0.780. The land size variable contributes the most with a coefficient of 1,653.700, meaning every additional Rp 1 in land size increases farmers' income by Rp 1,653.700. Details of the data processing results are shown in Table 4.

Table 4 Results of Multiple Linear Regression

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	6247894,282	437054,218	
	High-Yield Seeds	1,149	1,649	0,369
	Fertilizers	0,780	0,858	0,654
	Land Size	1653,700	214,788	0,773

Source: Primary Data Processed, 2024

Furthermore, to evaluate the extent to which the independent variables in the model explain variations in the dependent variable, the coefficient of determination test was conducted. This test aims to determine the proportion of variation in the dependent variable explained by the independent variables used in the model. The analysis results show that the Adjusted R Square value reached 0.668. This figure indicates that 66.8% of the variation in farmers' income can be explained by the three main factors: the use of high-yield seeds, fertilizer

application, and land size. Meanwhile, the remaining 33.2% is influenced by other factors outside the scope of this model. These factors may include fluctuations in agricultural product prices, labor costs, production efficiency levels, and various other external aspects. More detailed information regarding the results of this test is presented in Table 5, which provides a comprehensive overview of the contribution of independent variables to the dependent variable in this study.

Table 5 Results of Adjusted R Square Coefficient

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,824[a]	,679	,668	1424740,598

a. Predictors: (Constant), Land Size, Fertilizers, High-Yield Seeds;

b. Dependent Variable: Income

Source: Primary Data Processed, 2024

A partial test was conducted to examine the influence of each independent variable individually on farmers' income. The test results show that high-yield seeds have a significance value of 0.488, which is greater than 0.05, meaning their influence on farmers' income is not statistically significant. Nevertheless, the quality of high-yield seeds remains an important factor in determining production outcomes. In contrast, the fertilizer variable has a significance value of 0.003, which is less than 0.05, indicating a significant influence on farmers' income. Similarly, land size has a significance value of 0.000, also indicating a significant influence on income. These results are summarized in Table 6.

Table 6 Results of t-Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6247894,282	437054,218		14,295	0,000
	High-Yield Seeds	1,149	1,649	0,369	0,697	0,488
	Fertilizers	0,780	0,858	0,054	5,909	0,003
	Land Size	1653,700	214,788	0,773	7,699	0,000

a. Dependent Variable: Income

Source: Primary Data Processed, 2024

To test the overall feasibility of the model, an F-test was conducted. The analysis results show that the F-statistic value is 64.793 with a significance level of 0.000, which is less than 0.05. This indicates that collectively, high-yield seeds, fertilizers, and land size have a significant

influence on farmers' income. Thus, this regression model is feasible for predicting the dependent variable. The complete results are shown in Table 7.

Tabel 7 Results of F-Test by ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	394565423505704,800	3	131521807835234,940	64,793	0,000[b]
	Residual	186749490994295,300	92	2029885771677,123		
	Total	581314914500000,100	95			

a. Dependent Variable: Pendapatan

b. Predictors: (Constant), Land Size, Fertilizers, High-Yield Seeds

Source: Primary Data Processed, 2024

The Effect of High-Quality Seeds on Farmers' Income in Kaway XVI Subdistrict, West Aceh Regency

Based on the data analysis, the use of high-quality seeds did not have a significant partial effect on farmers' income in Kaway XVI Subdistrict, West Aceh Regency. This is evidenced by a significance value of 0.488, which is greater than the significance level (α = 0,05). With a significance level above 5% or 0.05, the null hypothesis (H_o) is accepted, indicating that high-quality seeds do not have a significant impact on farmers' income. This finding aligns with the study by Wood & Scott (2021) and Atieno et al. (2023), which also concluded that the use of high-quality seeds does not affect farmers' income.

This result can be explained by field observations, which revealed that the types of seeds used by farmers are relatively uniform, with an average seed cost of IDR 358,177 per harvest for an average land area of 2,188 square meters. While seed costs are an essential component in crop cultivation, the potential of high-quality seeds requires appropriate supporting conditions to yield maximum results.

High-quality seeds are often designed for specific conditions, such as climate, soil type, and water requirements. If the seeds used are not compatible with local conditions, yields will not be optimal. Moreover, the higher cost of high-quality seeds compared to regular seeds increases production costs, and if yield improvements are insignificant or product prices are low, farmers' profits will not significantly increase. In some cases, farmers may even incur losses due to high input costs that are not offset by adequate income.

Another factor influencing the effectiveness of high-quality seeds is the need for supportive inputs, such as fertilizers, pesticides, and specialized cultivation techniques. High-quality seeds often require intensive treatment to achieve their productivity potential. However, small-scale farmers frequently face challenges in accessing and affording these inputs. Additionally, external factors like commodity price fluctuations, climate changes, pest infestations, and management efficiency also impact farmers' income.

Although high-quality seeds are designed to enhance productivity, their impact on farmers' income heavily depends on a holistic approach that addresses the need for other inputs, good management, and environmental and market support. Without integrating these factors, the use of high-quality seeds alone is insufficient to significantly impact farmers' income. Therefore, policies are needed that not only promote the use of high-quality seeds but also ensure farmers' access to other agricultural inputs, technical training, and market price stability.

The Effect of Fertilizer on Farmers' Income in Kaway XVI Subdistrict, West Aceh Regency

According to the data analysis, the fertilizer variable showed a significant effect on the income of rice farmers in Kaway XVI Subdistrict, West Aceh Regency. This is evidenced by a t-value of 5.909, which is greater than the t-table value (1.6614) at a 95% confidence level, and a significance value of 0.003, which is less than 0.05. Thus, the alternative hypothesis (H_2) is accepted, and the null hypothesis (H_0) is rejected, indicating that the use of fertilizer partially has a significant impact on farmers' income. This finding is consistent with studies by Van Wesenbeeck et al. (2021) and Toledo-Hernández et al. (2020), which also emphasized the critical role of fertilizers in supporting farmers' productivity and income.

Fertilizer is an essential component in crop cultivation, including rice farming. For rice crops, fertilizer not only provides nutrients for growth but also helps plants resist pests, diseases, and unpredictable weather conditions. Proper fertilization in terms of type, dosage, and timing can enhance harvest quality, such as producing rice grains with uniform size, better nutritional content, and higher market value.

In Kaway XVI Subdistrict, farmers spend an average of IDR 288,542 per harvest on fertilizers. Although this cost is significant, the resulting increase in crop yields offsets the expense, enabling farmers to achieve higher incomes.

However, the benefits of fertilizer extend beyond abundant harvests; it also contributes to the sustainability of farming practices. Fertilizer helps maintain soil fertility and enhances land productivity, providing farmers with stability against production risks. Through balanced fertilization, farmers can reduce losses caused by nutrient deficiencies that often make crops susceptible to pests or harvest failures.

From a social policy perspective by Settersten (2018), these findings highlight the importance of sustainable access to quality and affordable fertilizers for farmers. Fertilizer subsidies, for example, are strategic policies that not only help alleviate production costs but also ensure that small-scale farmers can compete in improving their productivity. Moreover, education and training on proper fertilizer use are essential for farmers to maximize the benefits of fertilizers without causing environmental damage.

Furthermore, this study underscores the need for a holistic approach to supporting farmers' welfare. Fertilization alone will not yield maximum results unless supported by other factors such as water availability, adequate farming tools, and market price stability. By integrating policies oriented toward resource redistribution, social welfare improvement, and

sustainable development, the government can ensure that the fertilizer variable contributes not only to short-term productivity but also to the long-term economic sustainability of farmers.

The Effect of Land Size on Farmers' Income in Kaway XVI Subdistrict, West Aceh Regency

Based on data analysis, the land size variable has a significant effect on rice farmers' income in Kaway XVI Subdistrict, West Aceh Regency. This is indicated by a t-value of 7.699, which is greater than the t-table value (1.6614) at a 95% confidence level, with a significance value of 0.000, much smaller than 0.05. Thus, the alternative hypothesis (H_3) is accepted, and the null hypothesis (H_0) is rejected. In other words, land size partially has a significant impact on farmers' income. This result aligns with findings from Deng et al. (2022) and Chand (2017), which also emphasized that land size is a critical factor in determining farmers' income.

Land size is a fundamental aspect of farming, as it determines production capacity and potential income. The larger the land managed, the greater the opportunity to increase harvest yields. However, the reality in Kaway XVI Subdistrict shows that most farmers have less than one hectare of land. Small-scale farming often presents significant challenges in achieving optimal efficiency and productivity.

On the other hand, small landholdings can be managed efficiently with appropriate technology and farm management practices. Smaller plots are easier to monitor, require less labor, and have lower operational costs. However, field observations reveal that many farmers have yet to adopt modern technology or efficient management practices, leading to suboptimal results.

From the perspective of social inequality theory, disparities in land ownership are a root cause of the low income of small-scale farmers (Hurst et al., 2016). These disparities create a widening gap between small-scale farmers and those with larger-scale farming operations. In this context, land redistribution or agrarian reform policies become highly relevant. By ensuring equitable land distribution, small-scale farmers can gain access to larger plots, enabling them to scale up their farming operations.

Additionally, land intensification approaches are essential to optimize productivity for farmers with limited land (Pretty, 2018). Education on modern technology use, efficient fertilizer management, and crop diversification can provide practical solutions for increasing harvest yields. Farmers need to be equipped with knowledge and skills to maximize land use without relying solely on land expansion. However, land size is not the sole factor determining the success of farming. Other factors, such as market price stability, access to capital, and availability of agricultural infrastructure, also play critical roles. The government needs to focus on policies that support small-scale farmers, whether through fertilizer subsidies, provision of agricultural tools and machinery, or commodity price stabilization. With proper support, small-scale farmers can enhance their competitiveness, even with limited land resources.

CONCLUSION

This study highlights the roles of high-quality seeds, fertilizers, and land size in increasing farmers' income in Kaway XVI Subdistrict, West Aceh Regency. The analysis reveals that high-quality seeds do not have a significant effect on farmers' income. This indicates that the use of high-quality seeds alone is insufficient to drive income growth without the support of suitable environmental conditions, technology, and proper cultivation practices. Therefore, a more in-depth evaluation of the factors influencing the effectiveness of high-quality seeds in the field is needed. In contrast, fertilizers and land size are proven to have a significant effect on farmers' income. Fertilizers, as a vital agricultural input, enhance productivity and crop quality when applied effectively and at the right time. Land size, as an indicator of production capacity, demonstrates that the larger the area managed, the greater the potential income farmers can achieve. The combination of these factors significantly contributes to farmers' income, underscoring the importance of optimizing agricultural inputs and efficient land management. Simultaneously, high-quality seeds, fertilizers, and land size collectively have a positive and significant effect on farmers' income. This finding underscores the need for a holistic approach to building farmers' economic resilience. These results provide a crucial foundation for developing policies to support the agricultural sector, particularly by enhancing farmers' access to quality fertilizers, expanding land availability, and implementing relevant agricultural technologies. To support farmers' economic resilience, more targeted policy interventions are necessary. Such policies should include providing subsidized fertilizers, facilitating land access through agrarian reform, and conducting farmer education on efficient and sustainable farming practices. With a comprehensive approach, the agricultural sector can make a more substantial contribution to improving farmers' welfare and fostering sustainable economic resilience.

REFERENCES

Afroz, N. N. (2018). Effects of training on employee performance-A study on banking sector, Tangail Bangladesh. *Global Journal of Economics and Business*, *4*(1), 111–124.

Amfo, B., & Ali, E. B. (2020). Climate change coping and adaptation strategies: how do cocoa farmers in Ghana diversify farm income? *Forest Policy and Economics*, *119*, 102265.

Atieno, E. O., Kilwinger, F. B. M., Almekinders, C. J. M., & Struik, P. C. (2023). How Kenyan potato farmers evaluate the seed: implications for the promotion of certified seed potato. *Potato Research*, *66*(3), 811–829.

BPS. (2024). *Luas Panen, Produksi, dan Produktivitas Padi Menurut Provinsi, 2021-2023*. https://www.bps.go.id/id/statistics-table/2/MTQ5OCMy/luas-panen--produksi--dan-produktivitas-padi-menurut-provinsi.html

Brookes, G., & Barfoot, P. (2020). GM crop technology use 1996-2018: farm income and production impacts. *GM Crops & Food*, *11*(4), 242–261.

Bryman, A., & Bell, E. (2015). *Business Research Methods*. Oxford University Press.

Ceballos, F., Kannan, S., & Kramer, B. (2020). Impacts of a national lockdown on smallholder farmers' income and food security: Empirical evidence from two states in India. *World*

Development, *136*, 105069.

Chand, R. (2017). *Doubling Farmers' Income Rationale, Srategy, Prospects and Action Plan*.

Clunies-Ross, T., & Cox, G. (2023). Challenging the productivist paradigm: organic farming and the politics of agricultural change. In *Regulating agriculture* (pp. 53–74). Routledge.

Deng, X., Zhang, M., & Wan, C. (2022). The impact of rural land right on farmers' income in underdeveloped areas: Evidence from micro-survey data in Yunnan province, China. *Land*, *11*(10), 1780.

Finger, R., & El Benni, N. (2021). Farm income in European agriculture: new perspectives on measurement and implications for policy evaluation. *European Review of Agricultural Economics*, *48*(2), 253–265.

Hurst, C., Gibbon, H. F., & Nurse, A. (2016). *Social inequality: Forms, causes, and consequences*. Routledge.

Kansrini, Y., Febrimeli, D., & Mulyani, P. W. (2021). Analysis of the motivation of coffee farmers in applying good agriculture practices in arabic coffee commodities in south tapanuli district. *Psychology and Education Journal*, *58*(2), 6411–6418.

Karunarathna, I., Gunasena, P., Hapuarachchi, T., & Gunathilake, S. (2024). *Comprehensive data collection: Methods, challenges, and the importance of accuracy*. ResearchGate. https://www. researchgate. net/publication ….

Mohajan, H. K. (2020). Quantitative research: A successful investigation in natural and social sciences. *Journal of Economic Development, Environment and People*, *9*(4), 50–79.

Pretty, J. (2018). Intensification for redesigned and sustainable agricultural systems. *Science*, *362*(6417), eaav0294.

Rahmaniah, H., Darma, R., Asrul, L., & Taufik, D. K. (2020). The potential of organic agriculture, soil structure and farmers income for inclusive agriculture sustainability: a review. *IOP Conference Series: Earth and Environmental Science*, *575*(1), 12099.

Rusliana, N., Putra, A. S., & Kadarisman, E. (2023). Identification of Determinants Entrepreneurial Intentions during the Covid Pandemic on Open Unemployment in Tasikmalaya. *JMK (Jurnal Manajemen Dan Kewirausahaan)*, *8*(2), 134–145.

Sapkota, T. B., Jat, M. L., Rana, D. S., Khatri-Chhetri, A., Jat, H. S., Bijarniya, D., Sutaliya, J. M., Kumar, M., Singh, L. K., & Jat, R. K. (2021). Crop nutrient management using Nutrient Expert improves yield, increases farmers' income and reduces greenhouse gas emissions. *Scientific Reports*, *11*(1), 1564.

Settersten, R. A. (2018). Rethinking social policy: Lessons of a life-course perspective. In *Invitation to the life course* (pp. 191–222). Routledge.

Sharma, K., Sharma, C., Sharma, S., & Asenso, E. (2022). Broadening the research pathways in smart agriculture: predictive analysis using semiautomatic information modeling. *Journal of Sensors*, *2022*(1), 5442865.

Sinaga, N. S., Damanik, D., & Panjaitan, P. D. (2022). Analysis of the Effect ofSinaga, N. S., Damanik, D., & Panjaitan, P. D. (2022). Analysis of the Effect of Provision of People's Business Loans on Farmers' Income in Bosar Maligas District, Simalungun Regency. Journal Research of Social Science, Economics,. *Journal Research of Social Science, Economics, and Management*, *1*(6), 721–735.

Tanjung, A. F., Iskandarini, I., & Lubis, S. N. (2020). *Analysis Of Rice Farmer's Income In District Labuhan Batu*.

Toledo-Hernández, M., Tscharntke, T., Tjoa, A., Anshary, A., Cyio, B., & Wanger, T. C. (2020). Hand

pollination, not pesticides or fertilizers, increases cocoa yields and farmer income. *Agriculture, Ecosystems & Environment*, *304*, 107160.

Van Wesenbeeck, C. F. A., Keyzer, M. A., Van Veen, W. C. M., & Qiu, H. (2021). Can China's overuse of fertilizer be reduced without threatening food security and farm incomes? *Agricultural Systems*, *190*, 103093.

Walliman, N. (2021). *Research methods: The basics*. Routledge.

Wang, Y., Weng, F., & Huo, X. (2023). Can digital finance promote professional farmers' income growth in China?—An examination based on the perspective of income structure. *Agriculture*, *13*(5), 1103.

Wood, J. A., & Scott, J. F. (2021). Economic impacts of chickpea grain classification: how 'seed quality is Queen'must be considered alongside 'yield is King'to provide a princely income for farmers. *Crop and Pasture Science*, *72*(2), 136–145.