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The Structural Model of Corporate Farming in Improving the Welfare of Sugarcane Farmers in Malang Regency

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ABSTRACT
This study aims to analyze the structural model of corporate farming in improving the welfare of sugarcane farmers in Malang Regency. As an agrarian country, Indonesia has great potential in developing sugarcane as a raw material for the sugar industry; however, domestic production has not yet been able to meet national demand. PG Krebet Baru in Malang Regency has implemented a corporate farming model since 2015 through the nucleus-plasma scheme. The study uses a quantitative approach with Structural Equation Modeling based on Partial Least Squares using WarpPLS software. The research sample consisted of 67 partner sugarcane farmers of PG Krebet Baru, selected using the Slovin formula. Data were collected through observation and in-depth interviews using a Likert scale questionnaire.

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INTRODUCTION

Indonesia, as an agrarian country, has great potential in the development of the plantation sector, one of which is sugarcane (Saccharum officinarum) as the main raw material for the sugar industry. Sugar is a strategic commodity needed by all households in Indonesia; however, domestic production has not been able to meet national demand, thus still relying on imports (Amaliya et al., 2025). Sugarcane plays an important role in supporting the National Sugar Self-Sufficiency Program and is one of the leading commodities that is highly commercial as a raw material for making sugar and monosodium glutamate (Larmintho, 2023).

Malang Regency is one of the sugarcane production centers in East Java with two operating sugar mills, namely PG Krebet Baru and PG Kebonagung. Data (Malang Regency BPS, 2023) shows that the sugarcane planting area in Malang Regency reaches 44,825 ha with a production of 4,016,352 tons. Although there has been an increase in the planting area from 2019-2023, production has fluctuated, peaking in 2022 at 4,099,432 tons and dropping drastically in 2020 to 40,151 tons.

Krebet Baru Sugar Factory, established in 1906 and managed by PT Rajawali Nusantara Indonesia (RNI), has a grinding capacity of 12,000 TCD (Ton Capacity Daily). Since 2015, PG Krebet Baru has implemented a corporate farming pattern with sugarcane farmers through a core-plasma scheme. Corporate farming is a form of collaboration between small businesses and medium or large enterprises that applies the principle of mutual dependence, strengthening, and benefiting each other to increase productivity based on shared interests.

The corporate farming program of PG Krebet Baru includes guidance, provision of production facilities, and market guarantees for partner farmers, with the obligation

for farmers to sell their harvest according to the agreed price. This program has been proven to increase the productivity of partner farmers' sugarcane to 8-10 tons per hectare, well above the national average of around 5 tons per hectare, and to increase farmers' income by 30-40% compared to before partnering. However, the corporate farming relationship between sugar factories and sugarcane farmers often faces challenges such as inadequate sugarcane prices, delayed payments, and unclear partnership schemes, leading to conflicts and prompting farmers to switch to other commodities. Strong collaboration between sugar factories and farmers is a key factor in improving productivity and the welfare of both parties. This study aims to identify the factors that influence corporate farming, the partnership development model, and its impact on the welfare of sugarcane farmers in Malang Regency using a Structural Equation Modeling (SEM) approach.

LITERATURE REVIEW

The Role of Corporate Farming in Improving Farmers' Welfare

Corporate farming is a strategy that is becoming increasingly popular in efforts to improve the welfare of farmers worldwide. This corporate farming involves collaboration among farmers, the government, non-profit organizations, the private sector, and various other stakeholders (Arif et al., 2025). Through effective corporate farming, various parties can work synergistically and contribute according to their respective expertise and resources, with the main goal of increasing farmers' income, productivity, and quality of life (Bawono, 2018).

One of the important roles of corporate farming in improving farmers' welfare is through providing access to broader markets. Farmers often face challenges in marketing their harvests, especially if they are in remote areas or have limitations in terms of transportation and infrastructure (Nugraha et al., 2024). Through partnerships with agribusiness companies or cooperatives, farmers can gain access to wider markets, both domestic and international. This allows them to sell their products at more profitable prices and earn higher incomes. In addition, corporate farming can also facilitate technology transfer and capacity building for farmers. Research organizations and academic institutions can collaborate with farmers to develop and introduce more efficient, sustainable, and economically profitable farming practices (Sari et al., 2024). Training and mentoring provided through corporate farming can help farmers improve their skills in land management, selection of quality seeds, pest control, and proper harvesting techniques. This can increase productivity and the quality of crop yields, which in turn will boost farmers' income.

RESEARCH METHOD

The research was conducted in Malang Regency in March–April 2025, involving sugarcane farmers who partner with PG Krebet Baru located in Krebet, Bululawang, Malang Regency. The sample determination used Slovin's formula with a population of 16,000 partner farmers of PG Krebet Baru. The formula for determining the sample with a known population has already been established (Subhaktiyasa, 2024).

$$n = \frac{NZ_{(1-\frac{\alpha}{2})^2}P(1-P)}{Nd^2 + Z_{(1-\frac{\alpha}{2})^2}P(1-P)}$$

Description:
n = Sample size
N = Population size

Z (1 -) = Standard normal distribution value, the magnitude depends on the confidence level (CL).

If CL is 90%, the value is 1.64, CL 95% = 1.96, CL 99% = 2.57.

P = Proportion of occurrence (if the proportion of occurrence is unknown, it is recommended = 0.5)

d = Desired deviation from the population.

If 10% then d = 0.1, if 5% = 0.05, if 1% = 0.01.

The total population of farmers partnering with PG Krebet Baru is 16,000 farmers. Therefore, the sample determination result is:

$$n = \frac{16.000 \times (1{,}64)^2 \times 0{,}5\ (1 - 0{,}5)}{16.000 \times (0{,}1)^2 + (1{,}64)^2 \times 0{,}5\ (1 - 0{,}5)}$$

n = 66.9

n = 67 samples

So the number of samples taken is 67.

This study uses primary data with a cross-sectional method through: Observation: Direct observation of corporate farming activities at the research location to obtain information about the partnership patterns between sugarcane farmers and PG Krebet Baru. In-Depth Interview: Structured interviews with respondents to obtain complete data and information needed regarding the research topic. Data were collected using a questionnaire with a 5-point Likert scale: Very Good (5), Good (4), Fair (3), Poor (2), and Very Poor (1) (Rosita et al., 2021)

Research Variables include Exogenous Variables (X): X1: PG Krebet Baru (Rights and Obligations of the Sugar Factory). X2: Sugarcane Farmers (Rights and Obligations of Farmers). Endogenous Variables (Y): Y1: Corporate Farming (Information Transparency, Provision of Agricultural Inputs and Financing, Technical Assistance, Marketing Assurance, Cash Payments, Cooperation Contracts, Land Ownership). Y2: Welfare of Sugarcane Farmers (Population, Health and Nutrition, Education, Employment, Standard and Consumption Patterns, Housing).

Validity and Reliability tests were conducted by comparing the Corrected Item Total Correlation value (calculated r) with the criteria of r calculated > 0.3 to indicate that the item is valid (Rosita et al., 2021). Reliability tests used Cronbach's Alpha with a criteria value > 0.6 for

Data analysis was conducted using Structural Equation Modeling (SEM) based on Partial Least Squares (PLS) with WarpPLS software (Sholihin & Ratmono, 2021). The PLS method was chosen because it can be applied to all data scales, does not require many assumptions, and can be used with a relatively small sample size.

The stages of analysis include:

1. Designing the inner model (structural model) that illustrates the relationships between latent variables
2. Designing the outer model (measurement model) that shows the relationships between variables and their indicators
3. Evaluation of the model's goodness-of-fit using the criteria: APC, ARS, and AARS ($p < 0.05$); AVIF and AFVIF (≤ 5); GoF (≥ 0.25); SPR, RSCR, SSR, and NLBCDR (≥ 0.7) (Arvianti et al., 2015)
4. Hypothesis testing using the t-statistic test with a significance level of p-value $\leq$ 0.05 (alpha 5%)

The structural research model examines the influence of the rights and obligations of PG Krebet Baru (X1) and sugarcane farmers (X2) on corporate farming (Y1), as well as the influence of corporate farming on the welfare of sugarcane farmers (Y2).

RESULT AND DISCUSSION

Measurement Model

The use of WarpPLS analysis requires two types of model evaluation, namely, using the Outer Model and the structural model (Inner Model) (Hair Jr et al., 2020). The Outer Model is used with orientation toward three criteria, namely: convergent validity, discriminant validity, and composite reliability (Djaya, 2021). According to (Sholihin & Ratmono, 2021), the measurement model in SEMPLS is usually referred to as the outer model. This measurement model (outer model) is used to describe the relationship between indicators and their variables by assessing reliability and validity. Validity testing in this study is divided into two, namely convergent validity and discriminant validity. Validity testing is a test used to determine and examine the accuracy and consistency of a measuring instrument to be used as a measure of what should be measured. Validity testing consists of convergent validity and discriminant validity.

Convergent Validity

The convergent validity of a measurement model can be seen from the correlation between item/indicator scores and their construct (loading factor), with the criterion that the loading factor for each indicator > 0.70 considered valid and a P-Value of 0.05 considered significant. According to Sholihin & Ratmono (2021), in some cases, the requirement of loading > 0.70 is often not met, especially for newly developed questionnaires. Therefore, loading factors between 0.40 – 0.70 should still be considered to be retained. Furthermore, it is explained that indicators with a loading < 0.40 should be removed from the model. The removal of indicators with loading between 0.40 – 0.70 is carried out if the indicator can increase the AVE and composite reliability above their threshold values. The threshold values for AVE are 0.50 and for composite reliability are 0.70. Below are the results of the combined loading and cross-loading output.

Table.1 About a Output Combine Loading and Cross Loading

Indicator	*Cross Loading*	P-Value	Criteria	Description
X1.1	0,863	< 0.001	< 0,05	Valid
X1.2	0,863	< 0.001	< 0,05	Valid
X2.1	0,851	< 0.001	< 0,05	Valid
X2.2	0,851	< 0.001	< 0,05	Valid
Y1.1	0,923	< 0.001	< 0,05	Valid
Y1.2	0,876	< 0.001	< 0,05	Valid
Y1.3	0,947	< 0.001	< 0,05	Valid
Y1.4	0,843	< 0.001	< 0,05	Valid
Y1.5	0,820	< 0.001	< 0,05	Valid
Y1.6	0,947	< 0.001	< 0,05	Valid
Y1.7	0,735	< 0.001	< 0,05	Valid
Y2.1	0,873	< 0.001	< 0,05	Valid
Y2.2	0,874	< 0.001	< 0,05	Valid
Y2.3	0,878	< 0.001	< 0,05	Valid
Y2.4	0,820	< 0.001	< 0,05	Valid
Y2.5	0,920	< 0.001	< 0,05	Valid
Y2.6	0,884	< 0.001	< 0,05	Valid

Source: Warp PLS 7.0 Output processed in 2025

Based on the validity test results as shown in Table 1 above, it can be concluded that the values for all constructs have a P-Value < 0.05, which indicates that all constructs are measures of good Convergent Validity. Based on the data processing results, the values of Combined Loading and Cross Loadings are considered the best results. According to the criteria mentioned above, factor loading values between 0.40 – 0.70 should still be considered for retention, so it can be concluded that the values for all constructs are measures of good Convergent Validity. In addition to looking at the values in Combined Loading and Cross Loadings, convergent validity can also be tested using the AVE value. The AVE value must be greater than 0.5 (> 0.5) for each variable to be considered valid. The following table shows the AVE values.

Table 2. Average Variances Extracted (AVE)

Variables	AVE	Condition	Description
Aspects of Rights and Obligations of PG Krebet Baru	0,746	0,50	Valid
Aspects of Rights and Obligations of Partner Sugarcane Farmers	0,724	0,50	Valid
Aspects of Corporate Farming	0,762	0,50	Valid
Aspects of Sugarcane Farmers' Welfare	0,767	0,50	Valid

Source: Warp PLS 7.0 Output processed in 2025

Based on the validity test as shown in Table 2 above, it can be concluded that all Average Variances Extracted (AVE) values are above 0.50. This indicates that all constructs are a good measure of Convergent Validity (Sholihin & Ratmono, 2021).

Discriminant Validity Test

According to (Rosita et al., 2021), discriminant validity refers to the extent to which a construct is truly different from other constructs. In this study, discriminant validity was assessed using Cross Loading. According to (Sholihin & Ratmono, 2021), the rule of thumb for Cross Loading is that the indicator loading on the measured variable should be higher than the indicator loading on other variables.

Table 3. Cross Loading Values

Variable	X1	X2	Y1	Y2	P-Value	Description
X1.1	(0.863)	-0.164	-0.173	0.250	0,001	Valid
X1.2	(0.863)	0.164	0.173	-0.250	0,001	Valid
X2.1	-0.075	(0.851)	0.067	0.347	0,001	Valid
X2.2	0.075	(0.851)	-0.067	-0.347	0,001	Valid
Y1.1	-0.005	-0.063	(0.923)	-0.414	0,001	Valid
Y1.2	-0.036	0.091	(0.876)	-0.294	0,001	Valid
Y1.3	0.010	-0.044	(0.947)	-0.364	0,001	Valid
Y1.4	0.161	-0.178	(0.843)	0.458	0,001	Valid
Y1.5	-0.009	0.036	(0.820)	0.613	0,001	Valid
Y1.6	0.010	-0.044	(0.947)	-0.364	0,001	Valid
Y1.7	-0.150	0.248	(0.735)	0.599	0,001	Valid
Y2.1	-0.186	0.297	0.179	(0.873)	0,001	Valid
Y2.2	0.050	-0.187	-0.280	(0.874)	0,001	Valid
Y2.3	0.027	0.059	0.058	(0.878)	0,001	Valid
Y2.4	0.137	-0.156	-0.281	(0.820)	0,001	Valid
Y2.5	-0.044	-0.043	0.141	(0.920)	0,001	Valid
Y2.6	0.026	0.022	0.156	(0.884)	0,001	Valid

Source: Warp PLS 7.0 Output processed in 2025

From Table 3, it can be seen that the correlation of each variable with its indicators is higher compared to the correlation of the indicators of these variables with other variables. From the table above, it can be concluded that all indicators in this study can demonstrate good discriminant validity for all indicators.

Reliability Test

The reliability test is used to measure the consistency of a measuring instrument in measuring a concept. The reliability test is a measurement that indicates the extent to which the measurement is free from bias (error-free) and therefore ensures consistent measurement across time and across various items in its indicators (Firohmatillah & Arisena, 2021). Reliability testing can use two methods, namely Cronbach's Alpha and Composite Reliability. Cronbach's Alpha measures the lower limit of the reliability value of a variable, while Composite Reliability measures the actual reliability value of a variable. According to Sholihin and Ratmono (2021), the rule of thumb for Cronbach's Alpha and Composite Reliability values is greater than 0.7 (in exploratory research, 0.6 – 0.7 is still acceptable). The assessment of composite reliability is carried out by looking at the output of the latent variable coefficients. (Din et al., 2017) stated that the composite reliability of a construct meets internal consistency reliability if the value is > 0.7. Besides using composite reliability, reliability testing using Cronbach's Alpha also provides an estimate of inter-item correlations. The Composite Reliability estimate, like Cronbach's Alpha, takes into account the different loadings of the indicators. Data is considered reliable if Cronbach's Alpha > 0.60.

Table 4. Composite Reliability of Latent Variable Coefficients

Variables	*Composite reliab.*	*Cronbach's alpha*	Criteria	Description
Rights and Obligations of PG Krebet Baru	0,854	0,659	> 0,7	Reliable
Rights and Obligations of PG Krebet Baru	0,840	0,618	> 0,7	Reliable
Corporate Farming	0,957	0,947	> 0,7	Reliable
Welfare of Sugarcane Farmers	0,952	0,939	> 0,7	Reliable

Source: Warp PLS 7.0 Output processed in 2025

The reliability test results show that for the composite reliability criteria, the variables Corporate Farming and Sugarcane Farmers' Welfare have composite reliability values > 0.7 and Cronbach's Alpha >0.6, indicating that each variable is considered reliable as a measurement tool.

Structural Model

According to (Sholihin & Ratmono, 2021), the structural model in SEM-PLS is usually referred to as the inner model. The structural model (inner model) is used to predict causal relationships among latent variables. Testing the structural model is done by looking at the coefficient of determination (R-squared), Goodness of Fit, and Q-squared values. The R-squared value represents the amount of variance in the endogenous variable explained by all connected exogenous variables and also indicates the predictive accuracy of a SEM-PLS model (Mardiana & Faqih, 2019). The coefficient of determination (R-squared) values are 0.75, 0.50, and 0.25 for each endogenous latent variable in the structural model and can be interpreted as substantial, moderate, and weak. The higher the R-squared, the better the model. R-squared only exists for endogenous variables.

Table 5. R-Squared Test Values

Variables	R-Square	Adj. R-Square	Q-Square
Corporate Farming	0,481	0,465	0,293
Farmer Welfare	0,745	0,733	0,743

Source: Warp PLS 7.0 Output processed in 2025

The R-squared table shows the results of the analysis using the Warp PLS (Partial Least Squares) method. This method is used to analyze the relationship between two sets of interrelated variables. The analysis of the coefficient of determination shows an R-square value for Corporate Farming of 0.481, indicating that 48.1% of Corporate Farming (Y1) is influenced by the factors of rights and obligations of PG Krebet Baru (X1), the rights and obligations of sugarcane farmers (X2), and farmer welfare. The analysis of the coefficient of determination also shows an R-square value for Farmer Welfare of 0.745, indicating that 74.5% of Farmer Welfare (Y2) is influenced by the factors of rights and obligations of PG Krebet Baru (X1), the rights and obligations of sugarcane farmers (X2), and Corporate Farming.

Based on the Q-squared test results above, it can be seen that the Q-squared test result for the Corporate Farming variable is 0.293, indicating that the variables of the rights and obligations factors of PG Krebet Baru (X1), the rights and obligations of sugarcane farmers (X2), and farmer welfare are suitable for explaining the Corporate Farming variable. The Q-squared test results above also show that the Q-squared test result for the farmer welfare variable is 0.743, indicating that the variables of the rights and obligations factors of PG Krebet Baru (X1), the rights and obligations of sugarcane farmers (X2), and Corporate Farming are suitable for explaining the farmer welfare variable. Therefore, it can be concluded that the research model has predictive relevance because the Q-squared value is greater than 0. Thus, the research model used is suitable for this study, allowing for hypothesis testing to be conducted.

The Goodness of Fit test is used to evaluate the model as a whole. In this study, the Goodness of Fit test was conducted using the Average Path Coefficient (APC) and Average R-squared (ARS) with a p-value of less than 0.05 (< 0.05) to indicate a good model, as well as the Average Variance Inflation Factor (AVIF) and Average Full Collinearity Variance Inflation Factor (AFVIF) with an ideal value of ≤ 3.3, although a value of ≤ 5 is still acceptable for a good model.

Table 6 Goodness of Fit Test Values

Test Index	Score
APC = 0,346, P<0,001	P < 0,05
ARS = 0,613, P<0,001	P < 0,05
AVIF = 1,419	acceptable if <= 5, ideally <= 3,3
AFVIF = 2,263	acceptable if <= 5, ideally <= 3,3

Source: Warp PLS 7.0 Output processed in 2025

In the APC and ARS test indices, the p-value is less than 0.05, namely P < 0.001. Then, the AVIF value is 1.419 and the AFVIF value is 2.263. Based on the GoF results above, it can be concluded that overall, this research model shows a good model and is therefore suitable for use. In addition, structural model testing is also carried out by looking at Q-squared. Q-squared is used to assess the predictive relevance of a set of predictor (exogenous) latent variables on a criterion (endogenous) variable. A Q-squared value > 0 indicates that the model has predictive relevance, while a Q-squared value < 0 indicates that the model has less predictive relevance (Sholihin & Ratmono, 2021). Overall, to assess the results of a model as being fit in the WarpPLS program, it

can be seen from the general results output. The following are the general result output results in this study:

Table 7. Model Fit and Quality Indices

Model Fit And Quality Indices	Indeks	P-Value	Criteria	Ket
Average Path Coefficients (APC)	0,346	< 0.001	< 0,05	Accepted
Average R-Squared (ARS)	0,613	< 0,001	< 0,05	Accepted
Average Adjusted R-Squared (AARS)	0,599	< 0,001	< 0,05	Accepted
Average Block Variance Inflation (AVIF)	1,419	< 5, ideally <= 3.3		Accepted
Average full collinearity VIF (AFVIF)	2,263	< 5, ideally		Accepted
Tenenhaus GoF (GoF)	0,715	<= 3.3		Large
Sympson's Paradox Ratio (SPR)	1	small >= 0.1, medium >= 0.25,		Accepted
R-Squared Contribution Ratio (RSCR)	1	large >= 0.36		Accepted
Statistical Suppression Ratio (SSR)	1	> 0,7		Accepted
Nonlinear Bivariate Causality Direction Ratio (NLBCDR)	1	>= 0,7		Accepted

Source: Warp PLS 7.0 Output processed in 2025

According to the analysis results, the model fit and quality indices indicate that each of the existing criteria meets the model fit and quality indices criteria.

Hypothesis Testing

Hypothesis testing is used to statistically examine the truth of a statement and to draw conclusions about whether the statement is accepted or rejected (Anuraga et al., 2021). According to Sholihin & Ratmono (2021), hypothesis testing is conducted by looking at the P-value. The significance level in this study is 5%. A hypothesis is accepted if the P-value < 0.05. Meanwhile, to determine the direction of the correlation coefficient relationship, the path coefficient is used. A positive correlation coefficient indicates that there is a positive relationship between variables, and similarly, a negative correlation coefficient indicates that there is a negative relationship between variables. The figure below shows the test results from the analysis using WarpPLS 7.0.

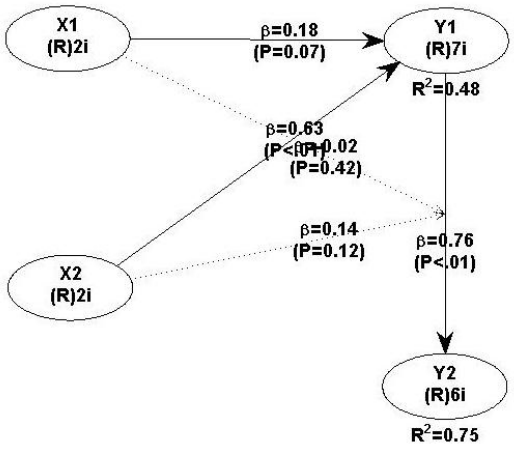

Figure 1. Research Path Model Diagram
Source: WarpPLS 7.0 Output processed in 2025

The figure above shows the testing of the research model. The research model was tested using WarpPLS 7.0 software. The arrows from one variable to another indicate the path coefficient values and p-values. Meanwhile, the numbers below the circles of variables Y1 (Corporate Farming) and Y2 (Farmer Welfare) represent the R2 values. In addition, the numbers inside the circles of each variable indicate the number of items/indicators in each variable.

Direct Effect

Table 8. Direct Effect

Relationship Between Variables	Path Coefficient	*P-Value* (a 5%)	Description
(Exogenous Variables → Endogenous Variables)	0,18	0,07 > 0,05	Not Significant (Weakly Significant)
Rights and Obligations Factor of PG Krebet Baru → Corporate Farming	0,63	0,01 < 0,05	Significant
Rights and Obligations Factor of Partner Sugarcane Farmers → Corporate Farming	0,76	0,01 < 0,05	Significant

Source: Primary Data processed in 2025

The Influence of Rights and Obligations Factors of PG Krebet Baru on Corporate Farming. The influence of the rights and obligations factors of PG Krebet Baru on Corporate Farming has a positive or direct relationship with a path coefficient value of 0.18 and a P value of 0.07 > 0.05, which indicates that the internal factor has a positive but not significant or weakly significant effect on Corporate Farming between PG Krebet Baru and partner sugarcane farmers in Malang Regency; thus, H0 is accepted and H1 is rejected. The Influence of Rights and Obligations Factors of PG Krebet Baru on Corporate Farming. The influence of the rights and obligations factors of PG Krebet Baru on Corporate Farming has a positive or direct relationship with a path coefficient value of 0.63 and a P value of 0.01 < 0.05, which indicates that the internal factor has a positive and significant effect on Corporate Farming between PG Krebet Baru and partner sugarcane farmers in Malang Regency; thus, H2 is accepted and H0 is rejected.

The Influence of Corporate Farming Factors on the Welfare of Sugarcane Farmers in Malang Regency. The influence of corporate farming factors on the welfare of sugarcane farmers in Malang Regency has a positive or direct relationship with a path coefficient value of 0.76 and a P value of 0.01 < 0.05, indicating that internal factors have a positive and significant effect on the welfare of sugarcane farmers in Malang Regency. Thus, H3 is accepted and H0 is rejected.

Moderation Influence

The moderation variable to address the fourth and fifth hypotheses, as shown in Table 5 below.

Table 9. Moderation Influence

Exogenous Variables	**Variabel Mediasi**	Endogenous Variable	**Path Coefficient**	**P-*value***	Description
Rights and Obligations Factors of PG Krebet Baru	*Corporate Farming*	Welfare of Partner Sugarcane Farmers	0,02	0,42>0.05	Not Significant
Rights and Obligations Factors of Partner Sugarcane Farmers	*Corporate Farming*	Welfare of Partner Sugarcane Farmers	0,14	0.12>0,05	Not significant

Source: Primary Data processed in 2025

From the results of the hypothesis test on the indirect effect above, it can be seen that: The Corporate Farming factor acts as a mediator for the effect of the Rights and Obligations of PG Krebet Baru on the Welfare of Partner Sugarcane Farmers. The direct path coefficient of the influence of Corporate Farming on the Welfare of Partner Sugarcane Farmers is 0.76 with a p-value of 0.01 < 0.05, and the mediation path coefficient of the Rights and Obligations of PG Krebet Baru on the Welfare of Partner Sugarcane Farmers through Corporate Farming is 0.02 with a p-value of 0.42 > 0.05. This indicates that the Corporate Farming factor does not mediate the effect of the Rights and Obligations of PG Krebet Baru on the Welfare of Partner Sugarcane Farmers. Therefore, H4 is rejected and H0 is accepted.

The Corporate Farming factor as a mediator of the influence of the Rights and Obligations of Partner Sugarcane Farmers factor on the Welfare of Partner Sugarcane Farmers. The direct path coefficient of the influence of the Corporate Farming factor on the Welfare of Partner Sugarcane Farmers is 0.76 with a p-value of 0.01 < 0.05, and the mediation path coefficient of the Rights and Obligations of Partner Sugarcane Farmers factor on the Welfare of Partner Sugarcane Farmers through Corporate Farming is 0.14 with a p-value of 0.12 > 0.05, indicating that the Corporate Farming factor does not mediate the influence of the Rights and Obligations of Partner Sugarcane Farmers factor on the Welfare of Partner Sugarcane Farmers. Thus, H5 is rejected and H0 is accepted.

The Influence of the Rights and Obligations Factor of PG Krebet Baru on Corporate Farming

The research results indicate that the rights and obligations factor of PG Krebet Baru has a positive but not significant effect on corporate farming, with a path coefficient of 0.18 and a p-value of 0.07 > 0.05. This finding suggests that although the rights and obligations of PG Krebet Baru contribute to the implementation of corporate farming, their influence is relatively weak in determining the success of the partnership.

The aspects of rights and obligations of PG Krebet Baru, which include the right to receive sugarcane supplies according to the contract, to determine quality standards, purchase priorities, land monitoring, and the obligation to provide quality seedlings, agricultural equipment assistance, technical guidance, purchase guarantees for harvest results, timely payments, and access to financial institutions, are basically well understood by partner farmers before entering into cooperation. This aligns with research (Apriyani et al., 2019) which states that the nucleus-plasma pattern must be applied so that the mechanisms of rights and obligations have become common knowledge among sugarcane farmers in the region.

These findings differ from the research by Yakub & Rahman (2024), which found that clarity of rights and obligations of sugar mills is a crucial factor in building farmers' trust. This difference in results can be explained by the context of PG Krebet Baru, where information regarding rights and obligations has been communicated transparently from the beginning, so it no longer serves as a significant distinguishing factor. Farmers focus more on the implementation of these obligations in daily partnership practices rather than merely the existence of rights and obligations clauses in the contract.

The results of this study also confirm the view of Damanik & Purba (2019) that information transparency from the start of the partnership can reduce potential conflicts in the future. Thus, although the aspects of sugar mill rights and obligations are important as a formal foundation of the partnership, other factors, such as the concrete implementation of these obligations, are more determining for the effectiveness of corporate farming.

The Influence of the Rights and Obligations of Partner Sugarcane Farmers on Corporate Farming

The results of the study indicate that the rights and obligations of partner sugarcane farmers have a positive and significant effect on corporate farming, with a path coefficient of 0.63 and a p-value of 0.01 < 0.05. These findings suggest that the understanding and fulfillment of farmers' rights and obligations are strong determining factors in the success of partnership programs.

Aspects of farmers' rights, which include the right to receive clear price information, access to technical cultivation information, quality agricultural inputs, transparency in price calculations, and the right to express opinions, as well as the obligation to report crop developments, attend extension programs, maintain sugarcane quality, harvest according to optimal ripeness levels, and pay off credit on time, have been proven to significantly influence the implementation of corporate farming. These results align with the research by R. A. Putra et al. (2025), which found that farmers' active participation in partnership programs is largely determined by their understanding of the rights and obligations that must be fulfilled.

The findings of this study contrast with the results for the rights and obligations variable of PG Krebet Baru, which were not significant. This difference indicates that in the context of agribusiness partnerships, the commitment and compliance of farmers, as the economically weaker party, become more crucial in determining the sustainability of the partnership. This is supported by research (Nuraisyah et al., 2024) which states that education and training for farmers about their rights and obligations in partnerships can significantly improve the quality of program implementation.

Research (Hari, 2023) also confirms that farmers who have a good understanding of their obligations tend to practice more intensive and higher-quality sugarcane cultivation, which in turn increases productivity and strengthens partnership relationships. Thus, the socialization and internalization of farmers' rights and obligations become the key to building an effective and sustainable corporate farming.

The Influence of Corporate Farming Factors on the Welfare of Partner Sugarcane Farmers

The research results show that corporate farming has a positive and significant effect on the welfare of partner sugarcane farmers, with a path coefficient of 0.76 and a p-value of 0.01 < 0.05. The coefficient of determination (R^2) of 0.745 indicates that 74.5% of the variation in farmers' welfare can be explained by the corporate farming program, demonstrating a very strong and substantial effect.

These findings are in line with previous research reporting that the PG Krebet corporate farming program successfully increased the sugarcane productivity of partner farmers to 8-10 tons per hectare, well above the national average of around 5-6 tons per hectare (Dalilah, 2012), and increased farmers' income by 30-40% compared to before partnering. The results of this study provide further empirical evidence of the positive impact of corporate farming on broader welfare dimensions, not only in terms of income but also health, education, employment, consumption patterns, and housing.

The aspect of information transparency in corporate farming has proven to play a very important role. Easy access to information about milling schedules, sugarcane prices based on yield, and partnership policies allows farmers to plan their farming activities better. These results confirm the findings of (Pasaribu, 2015) who stated that intensive coordination and communication are key to harmonizing partnership relations. Information transparency reduces information asymmetry, which often becomes a source of conflict in agribusiness partnerships.

The provision of agricultural inputs and financing is the second highly significant factor. PG Krebet Baru provides quality seeds, fertilizers, and pesticides at special prices and offers access to financing through recommendations to financial institutions. This result aligns with research by Fauzi & Maula (2022), which found that assistance with agricultural inputs and low-interest financing through the Primary Cooperative for Sugarcane Farmers (KPPT) greatly helps farmers increase their farm investment. Research by Ariningsih et al. (2021) also confirms that the use of certified superior seeds provided through partnership programs can significantly boost sugarcane productivity, unlike the conventional system that still uses lower-quality seeds.

Technical assistance from PG Krebet Baru field staff plays an important role in transferring knowledge and technology to farmers. Farmers receive direct guidance in checking sugarcane Brix levels, pest and disease control, and proper cultivation techniques. These findings support research (Suliartini et al., 2021) which found that technical assistance from land preparation to post-harvest increases farmers' skills and farm productivity. Research (R. P. Putra & Dewi, 2025) also emphasizes the importance of continuous education and training for farmers to enhance their knowledge of good sugarcane cultivation techniques, considering that low farmer knowledge is one of the causes of low national sugarcane productivity.

Marketing assurance provides farmers with the certainty that all their harvest will be purchased by PG Krebet Baru at a price agreed upon in advance. This guarantee reduces marketing risks and allows farmers to focus on improving sugarcane productivity and quality. Unlike a non-partnership system, partnered farmers do not face the price and market uncertainties that often disadvantage independent sugarcane farmers. The cash payments made weekly after the harvest are an advantage of PG Krebet Baru's partnership system. Transparency in calculations and the absence of unclear deductions also increase farmers' trust in the partnership system.

A clear and written cooperation contract provides legal certainty for both parties. Partner farmers who have a contract gain access to various facilities from PG Krebet Baru. This study shows that contracts that do not contain disadvantageous clauses and are explained in detail to the farmers form the foundation of long-term trust. Land ownership also affects the welfare of partner farmers. Clear land ownership status and sufficient land area support the sustainability of long-term farming ventures and improve farmers' access to partnership facilities. Some farmers are even able to purchase additional land as sugarcane plantation areas registered as partners of PG Krebet Baru, indicating an increase in farmers' economic capacity through the partnership program. Overall, this study provides strong evidence that corporate farming with a comprehensive nucleus-plasma scheme is capable of improving farmers' welfare in a multidimensional way. This research reveals a broader impact on welfare, encompassing indicators of population, health and nutrition, education, employment, level and pattern of consumption, as well as housing conditions. Partner farmers reported an increased ability to meet their family's basic needs, access to health and education services, job stability, consumption diversification, and improvements in housing conditions.

The Role of Corporate Farming as a Mediating Variable

The study results indicate that corporate farming does not mediate the influence of PG Krebet Baru's rights and obligations on farmers' welfare (path coefficient 0.02; p-value 0.42 > 0.05) nor the influence of partner sugarcane farmers' rights and obligations on farmers' welfare (path coefficient 0.14; p-value 0.12 > 0.05). These findings indicate that corporate farming functions as an independent variable that directly affects farmers' welfare, rather than as a mediating mechanism of the influence of rights and

obligations of both parties.

This result differs from the initial assumption that the implementation of rights and obligations would influence welfare through the execution of the corporate farming program. This difference can be explained by the fact that in practice, the corporate farming program, which includes information transparency, the provision of agricultural inputs, technical assistance, marketing guarantees, and cash payments, operates independently as a structured system and does not depend on the dynamics of the formal rights and obligations agreed upon at the beginning of the partnership.

These findings have important implications that, to improve farmers' welfare, the main focus should be on strengthening the implementation of the corporate farming program itself, not just on refining the clauses of rights and obligations in the contract. This aligns with research (Kurdi et al., 2023) that emphasizes the importance of concrete implementation of partnership programs in increasing farmers' productivity and welfare.

CONCLUSION

Based on the research results, it can be concluded that the structural model of corporate farming between PG Krebet Baru and sugarcane farmers in Malang Regency makes a significant contribution to improving the welfare of partner sugarcane farmers. The factors of rights and obligations of PG Krebet Baru have a positive but not significant effect on corporate farming because these aspects have been well understood by farmers since the beginning of the cooperation. Conversely, the factors of rights and obligations of partner sugarcane farmers have a positive and significant impact on corporate farming, indicating that understanding and fulfilling the rights and obligations of farmers is a determining factor in the success of the partnership. Corporate farming has a positive and highly significant effect on the welfare of sugarcane farmers, proving that a comprehensive partnership program—including transparency of information, provision of agricultural inputs and financing, technical assistance, market guarantees, cash payments, clear cooperation contracts, and land ownership—can improve farmers' welfare in a multidimensional way.

The corporate farming program of PG Krebet Baru has been proven to successfully increase sugarcane productivity and farmers' income through the nucleus-plasma system that has been in place since 2015. The cash payment system, transparency of information, direct technical assistance, and marketing guarantees create trust and long-term commitment. This study provides practical implications for the development of agribusiness partnerships in the national sugarcane and sugar sector. It is recommended to replicate the PG Krebet Baru partnership model in other sugar mills, strengthen partnership institutions through farmer cooperatives, improve access to capital, and intensify education and technical training programs for sugarcane cultivation. Future research needs to analyze external factors such as government policies and climate conditions, as well as conduct comparative studies with other sugar mills to identify best practices that can be adopted more broadly.

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