

# The Determinants of Profitability in Indonesia Plantation and Food Crop Companies 2020–2024

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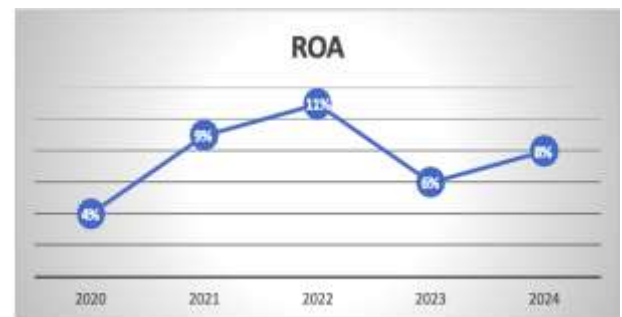
*Abstract- This study analyzes the influence of debt-to-equity ratio, current ratio, inventory turnover, sales growth, and total asset turnover on return on assets in Indonesian plant and food crop companies. Using panel data regression with a fixed effects model, the study examined 21 plantation and food crop companies listed on the Indonesia Stock Exchange (IDX) from 2020 to 2024, resulting in 99 observations after removing outliers. The result explains 66.93% of the variance in ROA, while the remaining 33.07% is explained by variables not included in the test. The results indicate that multiple factors influence the return on assets in the sample studied. The debt-to-equity ratio has a significant negative impact on the return on assets. The most important influencing factors, sales growth and total asset turnover, have a significant positive impact on return on assets, while the current ratio and inventory turnover have a minor or insignificant effect. Factories and investors in the plant and food crop sectors should use these correlations to assess their progress. This research contributes to the limited literature on financial determinants of profitability in the plantation and food crop sector, providing empirical evidence for stakeholders and investors in making financial decisions.*

**Keywords:** DER, CR, Inventory Turnover, Sales Growth, TATO, ROA.

## I. INTRODUCTION

The agri-food sector plays a crucial role in the Indonesian economy and has long been considered a key factor in the country's economic development. Indonesia has targeted a significant increase in food production by 2025. The high level of achievement in recent years has confirmed that Indonesia's leading sector remains highly competitive in ASEAN and global markets. The palm oil industry, in particular, acts as an economic catalyst in this sector, providing ample opportunities for plantations specializing in plantation management and food crop agriculture [1].

Return on Assets (ROA) is an important indicator of financial efficiency [2]. A high ROA signals that a production facility is utilizing its assets efficiently to generate revenue. This ratio measures a company's debt to equity; the higher the DER, the greater the company's reliance on creditors. However, the average ROA for crop and grain crop companies exhibited a monotonically increasing trend from 2020 to 2022, declined by 5% in 2023 but rebounded by 2% in 2024.



**Figure 1. Average ROA from Plant and Food Crop Companies**

Sources: Financial Report Companies, adjusted by researcher, 2025

Despite the importance of profitability in the plant and food crop sector, previous studies have shown inconsistent findings regarding the impact of financial ratios on ROA. Specifically, the roles of inventory turnover and total asset turnover remain understudied in this sector [3]. Furthermore, the fluctuating ROA trend between 2020-2024 suggests that companies may face challenges in maintaining optimal profitability.



## II. LITERATURE REVIEW

### 2.1 Agency Theory

Analysis considers the power dynamics between owners and their representatives or managers [4]. It examines how these managers must balance their interests to ensure transparent communication and guarantee that management decisions are legitimate from the perspective of the stakeholders.

### 2.2 Signaling Theory

Developed by Spence this concept outlines how companies communicate their financial forecasts to a wider range of external stakeholders and how they influence their investment decisions [5]. Companies publish financial reports using financial performance indicators that serve as a basis for strategic decisions.

### 2.3 Leverage

The debt-to-equity ratio (DER) is a measurable indicator of the relationship between a company's debt and equity [6]. Setiawan & Angelina points out that debt can cover irregular expenses related to daily needs [7]. Short-term debt covers outstanding receivables with a maturity of one year, such as loans for business expenses or office fees.

Long-term debt, on the other hand, includes arrears with a maturity of more than one year and typically includes bank loans. The ratio reflects a company's equity. Lenders and other stakeholders often prefer a low ratio or a low DER, as high ratios can be problematic in obtaining credit. The mathematical significance of that debt ratio can be explained in detail as follows:

$$\text{Debt to Equity Ratio} = \text{Total Debt} / \text{Total Shareholder's Equity}$$

### 2.4 Liquidity

Liquidity ratios assess a company's equity in relation to its outstanding financial liabilities. Fluctuating liquidity ratios generally indicate a more robust financial position. The term "commercial soundness" is often used to refer to a company's relationships with unknown actors, such as suppliers, banks, contractors, and governments [8]. In this context, these

other actors may have ownership claims on the company's assets. The tension can be interpreted in relation to the following points:

$$\text{Current Ratio} = \text{Current Assets} / \text{Current Liabilities}$$

### 2.5 Activity

Inventory turnover enables a newcomer to improve the energy efficiency of a company's resources. According by Amelia & Martaseli indicate that, provided that the corresponding anthropometry guides the security of the assets invested solely in stocks during a downturn [9]. A low inventory turnover ratio can signal weak sales and, consequently, excessively high inventory levels. Inside and out, a high inventory turnover ratio reflects adequate inventory management. The IT ratio is calculated according to:

$$\text{Inventory Turnover} = \text{Cost of Goods Sold} / \text{Average Supply}$$

According [10] points out that the TATO or total asset turnover reflects how efficiently a business uses resources to generate revenue. A higher value means better efficiency in boosting sales, that this ratio identifies how much revenue is generated from total assets and measures how efficiently capital is managed. It is computed as:

$$\text{Total Asset Turnover} = \text{Net Sales} / \text{Total Asset}$$

### 2.6 Sales Growth

Sales Growth (SG) is simply a measure of revenue growth across periods [11]. It is quantified by:

$$\text{Sales Growth} = (\text{Latest Sales} - \text{Previous Sales}) / \text{Previous Sales}$$

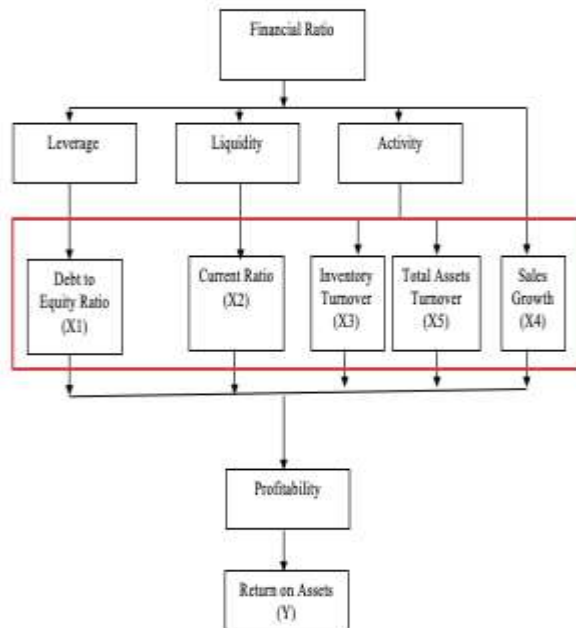


**2.7 Profitability**

Return on Assets (ROA) measures the profit earned on assets used [12]. ROA is used in previous work as a way to benchmark the efficiency of profit generation from a firm's asset base. Consistent with prior findings, a higher return on assets ratio indicates more capable and resourceful management of financial inputs [13]. The ROA is derived from:

$$\text{Sales Growth} = (\text{Latest Sales} - \text{Previous Sales}) / \text{Previous Sales}$$

**2.8 Theoretical Framework**



**Figure 2. 1 Theoretical Framework**

Source: Adjusted by Researcher, 2025

**2.9 Hypothesis Development**

Based on the theoretical framework and previous studies, the following hypotheses are formulated:

- H1:** Debt-to-Equity Ratio has a significant impact on ROA
- H2:** Current Ratio has a significant impact on ROA
- H3:** Inventory Turnover has a significant impact on ROA
- H4:** Sales Growth has a significant impact on ROA

**H5:** Total Asset Turnover has a significant impact on ROA

**H6:** DER, CR, Inventory Turnover, Sales Growth, and TATO simultaneously have a significant impact on ROA.

**III. RESEARCH METHODS**

This research uses quantitative panel data regression with Fixed Effects Model. Sample consists of 21 companies with 99 observations after outlier removal. The population consists of all plantation and food crop companies listed in the IDX from 2020 to 2024. This population generally includes 37 manufacturers during this period [14]. The researcher applied specific purposive sampling criteria to the population of plantation and food crop units on the IDX (2020–2024).

**Table 3.1 Sampling Plan**

No	Description	Total
1	List of agribusiness companies between 2020-2024	37
2	The company does not have plantations (only oil processing)	(3)
3	Companies that did not provide detailed financial reports between 2020-2024	(2)
4	Companies that have suffered consecutive losses	(11)
5	Total number of companies used as research samples	21
6	Total Sample	21 x 5 = 105
7	Data outliers	(6)
8	Total sample without data outlier	99

Source: adjusted by the researcher. 2025

**IV. RESULT AND DISCUSSION**

**Result**

Descriptive review summarizes or describes data to make it informative and simpler to interpret. Those data encompass max, min, avg, med, and std dev values. Below is a descriptive review of all factors used in this inquiry a total of 99 samples were from plantation and food crop firms listed on the IDX between 2020 and 2024.



	ROA	DER	CR	IT	SG	TATO
Mean	0.069409	1.185754	2.546858	10.01287	15.40404	0.648761
Median	0.062304	0.881985	1.444785	7.117557	8.200000	0.558304
Maximum	0.179861	7.801917	19.25000	81.33333	125.0000	1.761602
Minimum	-0.019702	0.027027	0.405099	0.637221	-40.50000	0.266578
Std. Dev.	0.044968	1.148529	3.168057	9.903692	26.31244	0.333632

**Figure 4.1 Descriptive analysis**

Source: EView, 12.00

Based on the results of the descriptive analysis in the table above, the following is the descriptive analysis:

- Return on Assets this factor is a dependent factor. The avg value is 0.069409 and the med is 0.062304. The max value is achieved in the firm PT Sumber Tani Agung assets Tbk (STAA) in 2024 with a ROA of 0.179861 (17.98%) and a min value achieved at the firm PT. Sampoerna Agro Tbk (SGRO) in 2020 with a ROA of -0.019702 (-1.97%). And the std dev is 0.044968.
- Debt to Equity Ratio, this factor is an independent factor. The avg value is 1.185754 and the med value is 0.881985. The max value is achieved insidet the organization PT. Nusantara Sawit Sejahtera Tbk (NSSS) in 2020 with a DER of 7.801917 and a min value achieved at the organisation PT. Pulau Subur Tbk (PTPS) in 2024 with a DER of 0.027027. And the std dev is 1.148529.
- Current Ratio, this factor is an independent factor. The avg value is 2.546858, and the med value is 1.444785. The max value is achieved in the corporation PT. Pulau Subur Tbk (PTPS) in 2024 with a CR of 19.25000 and a min value achieved at the agency PT. Nusantara Sawit Sejahtera Tbk (NSSS) in 2020 with a CR of 0.405099. And the std dev is 3.168057.
- Inventory Turnover, this factor is an independent factor. The avg value is 10.01287 and the med value is 7.117557 The max value is achieved in the agency PT. Menthobi Karyatama Raya Tbk (MKTR) in

2020 with an inventory Turnover of 81.33333 and a min value achieved on the business enterprise PT. BISI global Tbk (BISI) in 2024 with an inventory Turnover of 0.637221. And the std dev is 9.903692.

- Sales Growth, this factor is an independent factor. The avg value is 15.40404 and the med value is 8.200000. The max value is achieved within the organization PT. Menthobi Karyatama Raya Tbk (MKTR) in 2021 with a sales growth of 125.0000 and a min value achieved at PT. BISI global Tbk (BISI) in 2024 with sales growth of -40.50000. And the std dev is 26.31244.
- Total Asset Turnover, this factor is an independent factor. The avg value is 0.648761 and the med value is 0.558304. The max value is achieved in the business enterprise PT Sinar Mas Agro (SMAR) sources and Technology in 2022 Tbk with a total Asset Turnover of 1.761602 and the min value achieved in the company PT. Austindo Nusantara Jaya Tbk (ANJT) in 2020 with a Total Asset Turnover of 0.266578. And the std dev is 0.333632.

Panel data regression before performing panel data review, it is essential to identify an efficient and accurate model after conducting the Chow and Hausman tests, the selected model was the fixed effect model.

Engaging in a Chow test can assist researchers identify whether a CEM or FEM model is appropriate for the study. If the results indicate acceptance of the null hypothesis, the best model to use is the CEM. However, if the results reject the null hypothesis, the best model to use is the FEM.

Redundant Fixed Effects Tests			
Equation: Untitled			
Test cross-section fixed effects			
Effects Test	Statistics	d.f.	Prob.
Cross-section F	7.386624	(20,73)	0.0000
Cross-section Chi-square	109.542709	20	0.0000

**Figure 4.2 Chow Test Result**



Based on the outcomes of the chow test, the cross-section prob of Chi-Square was  $0.0000 < 0.05$  so that the proper model was the FEM and rejected the null hypothesis.

Conducting a Hausman test can help researchers identify whether a REM or a FEM is suitable for the study. If the results indicate acceptance of the null hypothesis, the best model to use is the REM. However, if the results reject the null hypothesis, the best model to use is the FEM.

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	14.300544	5	0.0138

**Figure 4.3 Hausman Test**

Based on the results of the Hausman test, the cross-section random value was  $0.0138 < 0.05$  so that the proper model was the FEM and rejected the null hypothesis. the following regression, the selected model is the FEM. The normality check standards are passed if the Jarque-Bera probability is  $> 0.05$ . Jarque-Bera is generally used to describe statistical analysis. The following are the effects of the normality check.

Series: Standardized Residuals	
Sample 2020 2024	
Observation 99	
Mean	-8.41E-17
Median	-0.001959
Maximum	0.052489
Minimum	-0.051177
Std. Dev.	0.022317
Skewness	-0.019016
Kurtosis	2.984582
Jarque-Bera	0.005947
Probability	0.995532

**Figure 4.4 Normality Test Result**

Based on the outcomes of the normality test in table 4.4, the Jarque-Bera result was 0.005947 and a probability of 0.995532. Theoretically, this means the data is normally distributed because the outcomes obtained from the normality test were  $0.995532 > 0.05$ . Therefore, the data used is suitable for further

evaluation.

The heteroscedasticity to test whether in the regression model there is an inequality of variance from the residual from one observation to another. The test information use the Breusch-Pagan-Godfrey test. The criteria in this check are if the obs\*R- squared prob. Chi-square  $> 0.05$ . If it meets the standards, it passes the heteroscedasticity test.

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Null Hypothesis: Homoskedasticity			
F-statistic	1.222238	Prob. F(5,98)	0.3049
Obs*R-squared	6.104334	Prob. Chi-Square(5)	0.2962
Scaled explained SS	3.845735	Prob. Chi-Square(5)	0.5718

**Figure 4.5 Heteroskedasticity test**

This figure 4.5 have a result in an obs\*R-squared prob. Chi-square  $0.2962 > 0.05$ , therefore it can be concluded that there are no symptoms of heteroscedasticity, this means that the data is homoscedasticity.

A multicollinearity to take a look at is one approach to determine if the information suggests a robust correlation or correlation between two or extra unbiased variables. Multicollinearity occurs if the correlation value is  $> 0.80$ . The table beneath shows the outcomes of the multicollinearity check.

**Table 4.6 multicollinearity Test Result**

	DER	CR	IT	SG	TATO
DER	1.000000	-0.379830	0.086250	0.232798	-0.029286
CR	-0.379830	1.000000	-0.010075	-0.223007	-0.208541
IT	0.086250	-0.010075	1.000000	0.251626	-0.070377
SG	0.232798	-0.223007	0.251626	1.000000	-0.019558
TATO	-0.029286	-0.208541	-0.070377	-0.019558	1.000000

Based on the outcomes of the multicollinearity check conducted in table 4.6, it is verified that the coefficient value of every variable is  $< 0.80$ . therefore, it can be concluded that there are no symptoms of multicollinearity.

This autocorrelation test to see if inside the regression version there was a correlation among the interference mistakes within the t-period with the t-1 length (previous) The autocorrelation take a look at will skip if the condition  $DU < DW < 4-DU$ . The subsequent are the effects of the autocorrelation check:



DU	DW	4-DU	Criteria	Result
1.7799	2.0932	2.2201	DU < DW < 4-DU	No autocorrelation occurs

**Figure 4.7 Autocorrelation Test Result**

Based on the outcomes of the autocorrelation test in table 4.7 This shows that the information does not exhibit autocorrelation because the Durbin-Watson statistic (DW) of 2.0932 lies between the upper bound (DU=1.7799) and 4-DU (2.2201). Consequently, the information is suitable for further panel data regression.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.020451	0.018693	1.094001	0.2776
DER	-0.015917	0.004027	-3.952508	0.0002
CR	0.001578	0.001652	0.955503	0.3425
IT	9.80E-05	0.000397	0.246508	0.8060
SG	0.000463	0.000119	3.894628	0.0002
TATO	0.085858	0.023813	3.605559	0.0006

**Figure 4.8 Panel Data Regression Analysis**

The results of the panel data regression analysis using a fixed-effects model are shown in the accompanying table. The regression equation highlights the estimated effects of each variable on the dependent variable return on assets (ROA), providing insight into their combined impact on profitability. The components of the equation are explained below:

1. The constant value of the main regression equation is 0.020451. This signifies that if all independent variables were zero, the expected ROA would be 0.020451.
2. A negative coefficient. A 1 unit increase in DER, holding all else constant, is predicted to decrease ROA by 0.015917.
3. A positive coefficient. A 1 unit increase in CR is predicted to increase ROA by 0.001578. CR regression coefficient with a value of 0.001578.
4. A positive coefficient. A 1 unit increase in IT is predicted to increase ROA by 9.798006.
5. A positive coefficient. A 1 unit increase in SG is predicted to increase ROA by

0.000463. SG regression coefficient with a value of 0.000463.

6. A positive coefficient. A 1 unit increase in TATO is predicted to increase ROA by 0.085858.

Adjusted  $R^2 = 0.6693$ . The model's explanatory power, measured by the adjusted R-squared value, was 0.669350. This indicates that the independent variables (DER, CR, IT, SG, and TATO) collectively explain 66.93% of the fluctuation in ROA. The remaining 33.07% of this ROA fluctuation is attributable to the selection factors considered in this study.

**Table 4.1 Coefficient Determination Result**

R-Squared	0.753700
Adjusted R-squared	0.669350
S.E. of regression	0.025857

F-test shows model is significant. Since this value is significantly less than the 0.05 significance level, it confirms that all variables together exert a powerful, combined influence on the profitability (ROA) of the companies studied.

**Table 4.2 F-Test Result**

F-statistic	8.935452
Prob (F-statistic)	0.000000

Hypothesis (H0) that the financial ratios (DER, CR, IT, SG, and TATO) simultaneously have no effect on ROA is strongly rejected. This conclusion is based on the extremely low probability value of the F-statistic, which is 0.000000. Since this value is significantly less than the 0.05 significance level, it confirms that all variables together exert a powerful, combined influence on the profitability (ROA) of the companies studied. Consequently, the sixth hypothesis (Ha6) is accepted.



## Discussion

This finding is consistent with earlier research that companies with a high debt have higher interest expenses, which lowers the ROA [15]. This positive tuning efficiency suggests that this metric given the acceptance of improved payment potential (higher return on capacity) contributes to the overall financial stability of a trading company and its assets by strengthening short-term deficits. The lack of statistical significance in this critical analysis indicates that the tape is not statistically significant. Different with earlier studies, such as those in the agricultural sector [16]. The F&B industry generally describe significant effects .

Overall, it can be said that high levels of IT accelerate inventory management and strong product demand. Assuming an efficient turnover rate, this will quickly lead to significant ROA accumulation for the company [17]. This finding is not consistent with the conclusions of [18]. This demonstrates that SG over time is an important predictor of corporate growth and has a positive effect on profitability. Which recommendation supports the performance of previous studies in the f&b industry [19].

TATO measures how efficiently a company uses a plant to generate revenue. Higher TATO utility indicates efficient asset management, which is crucial in capital-intensive sectors like this industry (food crops and agriculture). This expertise is confirmed by earlier studies addressing problems in the agricultural sector [13].

This proves that the high amount of debt had significance influence on return on assets [20], liquidity has a significant influence [16], high inventory turnover value simultaneously had a positive influence by [21], increased sales growth has a positive and significant effect on return on assets [19], and the efficiency of companies in managing assets together affect the return on assets [15].

## V. CONCLUSION AND SUGGESTION

DER has a significant negative impact on ROA ( $\beta = -0.0159$ ,  $p < 0.05$ ). CR has no significant impact on ROA ( $p = 0.3425 > 0.05$ ). Inventory Turnover has no significant impact on ROA ( $p = 0.8060 > 0.05$ ). Sales Growth has a significant positive impact on ROA ( $\beta = 0.0005$ ,  $p < 0.05$ ). TATO has a significant positive impact on ROA ( $\beta = 0.0859$ ,  $p < 0.05$ ). All

independent variables simultaneously have a significant impact on ROA (F-test  $p < 0.05$ ). The model explains 66.93% of the variance in ROA.

Focus on reducing debt levels to improve profitability, increase sales growth through market expansion and product development. Improved asset efficiency to generate more revenue from assets. Evaluate companies based on leverage (DER), asset efficiency (TATO), and sales growth (SG), avoid companies with high debt ratios as they tend to have lower ROA. Include additional variables such as firm size, operating efficiency, and macroeconomic factors, extend the research period for more comprehensive results.

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