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Firm characteristics, ownership structure, and auditor type as determinants of biological asset disclosure in Indonesia

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Abstract

Biological assets are subject biological transformation, including growth, production, and reproduction, which creates specific challenges in their measurement and financial reporting. Therefore, adequate disclosure of biological assets is necessary to improve transparency and provide relevant information to financial statement users. This study examines the determinants of biological asset disclosure in agricultural product companies listed on the Indonesia Stock Exchange (IDX) during the 2019-2024 period. The initial sample identified 222 company-year records over the six-year observation period. 67 records that did not met the financial reporting and PSAK 69 standards and 18 outliers were removed, resulting in the final sample of 137 firm-year observations. Multiple linear regression was used to examine the effects of biological asset intensity, firm size, managerial ownership, public accounting firm type, leverage, and profitability on biological asset disclosure. The results indicate that firm size, managerial ownership, and public accounting firm type have positive and statistically significant effects on biological asset disclosure. Conversely, biological asset intensity, leverage, and profitability do not have statistically significant effects at the 5% significance level. While biological asset intensity has a p-value of 0.051, it does not meet the conventional 5% significance threshold. These findings provide empirical evidence of the role of firm characteristics, ownership structure, and auditor type in explaining biological asset disclosure practices among Indonesian agricultural product companies.

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1. Introduction

Indonesia is widely recognized as an agrarian country, with a substantial proportion of its population relying on the agricultural sector for their livelihoods (Kusumaningrum, 2019). According to the Indonesian Central Bureau of Statistics, the agriculture, forestry, and fisheries sectors accounted for 28.21 percent of total employment in 2023 (BPS, 2023), indicating a considerable contribution to the Indonesian economy. Furthermore, the contribution of the agricultural sector also highlights the importance of reliable financial reporting, by which

agricultural companies manage assets that undergo biological transformation. Unlike conventional assets, biological assets experience processes such as growth, degeneration, production, and procreation, which create complexities in their recognition, measurement, and disclosure. Consequently, transparent reporting of biological assets is important for enabling investors and other stakeholders to assess the financial position and performance of agricultural companies.

Assets are fundamental components in financial statements as they represent resources possessed by an entity that are expected to generate future economic benefits (Halim, 2015). Biological assets may comprise living animals and plants grown for agricultural activities (Ulupui et al., 2021). Their distinguishing feature is biological transformation, which encompasses changes in the assets' growth, quality, production capacity, and reproduction (Nurhayati et al., 2019). These changes create specific accounting challenges because the economic value of biological assets may change over time as a result of both natural processes and management activities.

Biological transformation refers to the natural processes that occur in biological assets, including growth, quality deterioration, production, and reproduction. These processes require specialized valuation methods (Campos-Llerena et al., 2025). The valuation must reflect the potential economic benefits that these assets can generate for the company (Dewi & Manggabarani, 2022). Accurate information on the value of biological assets is crucial because they represent a substantial portion of agricultural companies' assets and continuously undergo biological changes as they live (Kurniawati, 2020).

In Indonesia, accounting of biological assets is referring to Statement of Financial Accounting Standards (*Pernyataan Standar Akuntansi Keuangan*: PSAK) 69: Agriculture, which adopts the principles of International Accounting Standard Board (IASB) 41: Agriculture (IASB, 2016). PSAK 69 provides guidance on the recognition, measurement, presentation, and disclosure of biological assets and agricultural produce. Applying this standard is expected to improve the relevance and transparency of financial information reported by agricultural companies. However, its implementation may involve practical challenges, particularly in determining actual value and providing sufficient information about the nature, quantity, and changes in biological assets. Differences in the availability of information, reporting practices, and companies' commitment to accounting standards may therefore result in variations in the extent of biological asset disclosure.

This situation makes biological asset disclosure an important issue to investigate, particularly in the context of Indonesian agricultural companies. Prior to 2018, Indonesia used PSAK 16 on Fixed Assets as a reference for biological asset disclosure. This resulted in a lack of uniform accounting standards for biological assets and agricultural produce, creating difficulties for stakeholders in the agricultural sector (DSAK IAI, 2018; Hsu et al., 2019; Santoso & Handayani, 2021). PSAK 69, as an update, provides a more comprehensive and detailed framework for disclosing information on biological assets, thereby encouraging the use of fair value measurement models (Eilifsen et al., 2021; Zlati & Mirica, 2021). It also requires qualitative disclosures about risks and uncertainties associated with biological assets, as well as segment-specific financial information. Agricultural companies rely on the cultivation of natural resources for their operations and are closely associated with sustainability issues (Campos-Llerena et al., 2025; Zlati & Mirica, 2021). These companies are therefore subject to PSAK 69 in preparing their financial statements.

Based on this background, this study aims to identify the factors affecting biological asset disclosure among agricultural companies. This is particularly important because the challenges associated with measuring the value of biological assets may hinder adequate disclosure and reduce the usefulness of financial information for stakeholders' decision-making (Leitner-Hanetseder & Lehner, 2023). By relying on agency theory, this study predicts the role of several financial factors, including biological asset intensity, managerial ownership, firm size, type of auditor, leverage, and profitability.

This study contributes to the literature and practice of biological asset disclosure in two ways. First, the findings highlight the role of auditors in determining the extent of biological asset disclosure, showing that companies audited by Big Four firms tend to provide more extensive disclosures. This study complements the systematic review by Campos-Llerena et al. (2025) by providing empirical evidence on the factors associated with biological asset disclosure. Second, the study provides practical insights into the factors that may improve biological asset disclosure among agricultural companies. These findings offer a reference for understanding the implementation of PSAK 69 and how it is shaped by internal and external company factors.

2. Theoretical Framework and Hypotheses Development

Biological Assets Disclosure

DSAK IAI (2018) requires companies to comprehensively disclose information about their biological assets in order to provide transparency regarding the value, risks, and management of the company's biological assets. Information that required to be disclosed includes gains or losses and changes in fair value, ownership and collateral of biological assets, commitments for the development or acquisition of biological assets, financial risk management strategies, reconciliation of changes in biological assets, measurement of biological assets at acquisition cost, and disposal of biological assets.

The disclosure of biological assets, particularly in agricultural companies, is presented in the statement of financial position, the income statement, and the notes to the financial statements. Each statement has a different focus. For the statement of financial position, the disclosure covers the total value of biological assets, depreciation of biological assets, and accumulated depreciation. The disclosure in the income statement includes the recognition of gains or losses arising from the initial recognition of assets at fair value, net of associated costs, which are recorded in the profit and loss statement. Impairment of biological assets is recognized as a loss in the period in which it occurs. Additionally, a reconciliation of the carrying amount of biological assets between the beginning and end of the reporting period is provided, covering additions, disposals, impairments, and depreciation (Rachmawati et al., 2019).

Biological Assets Intensity and Biological Asset Disclosure

The intensity of biological assets refers to the proportion of biological assets within the total investment of the agricultural-product companies. This variable is commonly disclosed in the notes of financial statements (Aliffatun, 2020). It indicates the company's level of dependence on biological assets, which is that the higher the intensity, the greater the level of disclosure of biological asset information (Alfiani & Rahmawati, 2019).

Based on agency theory, this study predicts that a high intensity of biological assets increases the potential for conflicts of interest between the principal and the agent. Biological assets have complex and difficult-to-measure values, creating opportunities to manipulate financial information addressed primarily for stockholders. Concurrently, a high intensity of biological assets increases the need for more transparent disclosure to mitigate conflicts of interest and enhance stakeholder trust in the company (Halim, 2015). Altarawneh (2023) also shows that the intensity of biological assets positively correlates with the biological asset measurement practice. A higher intensity of biological assets indicates a greater proportion of company investment in biological assets, which increases the need for relevant and transparent disclosure. Therefore, companies with higher biological asset intensity are expected to provide more extensive information about their biological assets. Accordingly, the first hypothesis is proposed as follows:

H_1: Biological asset intensity positively affects biological asset disclosure.

Firm Size and Biological Asset Disclosure

Firm size refers to various aspects, such as total assets, total revenue, stock price, number of employees, the company's production capacity, or other relevant financial factors (Kieso et al., 2018). Firm size, therefore, represents the scale of a company (Purwanti, 2021). Larger companies generally have better resources and infrastructure in the financial reporting process, enabling them to produce more complex and comprehensive financial reports (Sucipto, 2020), which helps companies fulfill their responsibilities to stakeholders. Thus, information asymmetry is more likely to be minimized as the firm size increases.

This prediction follows previous studies by Ika et al. (2022) and Hernández & Tolentino (2024), who find that firm size influences the disclosure of biological assets. Larger companies have more resources to manage and comprehensively provide information than smaller companies. The findings align with Santoso & Handayani (2021), who also show similar results. Larger companies generally have greater resources and stronger incentives to provide comprehensive financial information to meet stakeholders' information needs and minimize information asymmetry. Accordingly, the second hypothesis is proposed as follows:

H_2: Firm size positively affects biological asset disclosure.

Managerial Ownership and Biological Asset Disclosure

Managerial ownership refers to the proportion of shares owned by key leaders and decision-makers within a company. Managerial ownership indicates the extent of control these individuals have over the company. It is calculated as a percentage of the company's total share capital owned by the management of the total outstanding shares (Sartono, 2010).

From an agency theory perspective, managerial ownership can help align the interests of managers and shareholders. When managers own shares in the company, they have greater incentives to protect the company's long-term value and maintain shareholders' confidence. Greater managerial ownership may therefore encourage managers to provide more transparent financial information, including disclosures related to biological assets (Alfiani & Rahmawati, 2019).

Previous study by Riski et al. (2019) states that managerial ownership influences the disclosure of biological assets. Investors prefer detailed disclosure of biological assets by agricultural companies to enhance their investment decision, so that access to complete information makes them well-informed, thereby reducing agency problems. More comprehensive disclosure can minimize information asymmetry and strengthen the alignment of interests between management and shareholders. Accordingly, the third hypothesis is proposed as follows:

H_3: Managerial ownership positively affects biological asset disclosure.

Type of Auditor and Biological Asset Disclosure

A Public Accounting Firm (PAF) is a legally established business entity founded by professional public accountants. This institution operates independently and is not affiliated with any party, ensuring its objectivity. Public accounting firms focus on providing audit services for the financial statements of business entities and ensuring their fair presentation in accordance with accounting standards. In addition to audits, public accounting firms also offer accounting services and financial and operational consulting for entities (Halim, 2015).

Prior studies have reported that auditor type and audit effort are associated with the reporting of key audit matters (Al-mulla & Bradbury, 2022; Suttipun, 2022). The type of public accounting firm may be associated with the extent of biological asset disclosure. Companies audited by Big Four firms may face different audit practices and reporting expectations compared with those audited by non-Big Four firms. These differences may be relevant to the extent of biological asset disclosure in their financial statements. Therefore, this study examines whether being audited by a Big Four-affiliated public accounting firm is associated with more extensive biological asset disclosure. Their audit practices may encourage companies to improve the completeness and transparency of financial reporting. Accordingly, the fourth hypothesis is proposed as follows:

H_4: Auditor type positively affects biological asset disclosure.

Leverage and Biological Asset Disclosure

Leverage is a form of ratio used to measure the extent to which a company's assets are financed through debt. This ratio indicates the portion of debt relative to equity, which used by a company to operate (Kasmir, 2022). A higher leverage ratio suggests the companies rely more on debt financing than equity to run their operations. Conversely, a lower leverage ratio indicates that the company rely more to its equity than debt to operate.

Based on agency theory, a high leverage ratio encourages companies to disclose more information to principals to reduce agency costs and minimize information asymmetry. Companies in this group have more debt than equity, making them more vulnerable to economic fluctuations. While creditors and investors demand more reliable information, those companies are more likely to disclose any relevant information, including a greater extent of biological assets disclosure.

A study by Joulanda & Wahidahwati (2021) suggests that leverage influences the disclosure of biological assets. Companies with higher leverage face greater monitoring demands from creditors and have stronger incentives to provide relevant and transparent financial information to reduce information asymmetry and agency costs. Therefore, higher leverage is expected to encourage more extensive biological asset disclosure. Accordingly, the fifth hypothesis is proposed as follows:

H_5: Leverage positively affects biological asset disclosure.

Profitability and Biological Asset Disclosure

Profitability measures a company's ability to generate profits and reflects its effectiveness in using capital to generate returns. A high level of profitability encourages investors to invest in the company. Conversely, investors may withdraw their capital if the company if profitability performance is low (Hanafi & Halim, 2016).

Companies that have high profitability tend to be more transparent in disclosing information to the public in order to obtain greater stakeholders' trust in the company's strong performance and competitive position. The higher the company's profitability, the more it is expected to disclose its biological assets. A high level of biological asset disclosure indicates that the company can effectively manage its biological assets and generate profits from them (Sakinatunnisak et al., 2020).

Overall, transparent disclosure of biological assets is predicted to help mitigate agency conflicts and build trust between the company and stockholders. Companies with higher profitability tend to provide more extensive disclosure of their biological assets (Hernández & Tolentino, 2024), thereby reducing potential conflicts of interest. Companies with higher profitability are expected to disclose more information about their biological assets to demonstrate effective asset management, communicate their financial performance, and maintain stakeholders' confidence. More extensive disclosure may also help reduce information asymmetry between management and shareholders. Accordingly, the sixth hypothesis is proposed as follows:

H_6: Profitability positively affects biological asset disclosure.

3. Methodology

This study examines biological asset disclosure among agricultural product companies listed on the Indonesia Stock Exchange (IDX) during the 2019-2024 period. A quantitative approach is employed to analyze secondary data obtained from companies' annual reports and financial statements. The sample was selected using purposive sampling based on two criteria: (1) the availability of published financial statements and annual reports for each respective observation year, and (2) the adoption of PSAK 69 on Agriculture by the companies during the observation period.

As presented in Table 1, the initial identification covered 222 company-year records across the six-year observation period. Of these, 7 records were excluded because the companies did not publish the required financial statements and annual reports, while additional 60 records were excluded because the companies had not adopted PSAK 69. Thus, 155 firm-year observations met the initial sample selection criteria. Subsequently, 18 outlier observations were removed, resulting in a final dataset of 137 firm-year observations for the analysis.

The number of company-year records varied across the observation years, indicating that the dataset did not contain an equal number of observations for each year. Accordingly, the dataset represents an unbalanced panel, as the sampled companies did not necessarily contribute observations for all six years of the study period. The data were analyzed to examine the relationships between biological asset disclosure and six explanatory variables: biological asset intensity, firm size, managerial ownership, public accounting firm type, leverage, and profitability.

Table 1. Sample selection

Year	Number of Listed Agricultural Product Companies	Company-Year Records Excluded: Financial Statements and Annual Reports Not Published	Company-Year Records Excluded: PSAK 69 Not Adopted	Eligible Firm-Year Observations
2019	25	–	17	8
2020	26	–	16	10
2021	27	–	12	15
2022	39	2	5	32
2023	48	2	5	41
2024	57	3	5	49
Total	222*	7	60	155
Less: Outlier observations				(18)
Final firm-year observations				**137**

The initial screening also revealed that some companies classified within the agricultural product sector did not report biological assets in their financial statements, indicating that these companies did not own biological assets during the relevant reporting periods, despite their sector classification. Therefore, the absence of biological asset disclosure should not automatically be interpreted as non-compliance with PSAK 69, since the applicability of the standard's specific recognition and disclosure requirements depends on the underlying assets and transactions of each company. This distinction is important when interpreting the biological asset disclosure scores and the regression results.

Operational Definition and Variable Measurement
Biological asset disclosure

The dependent variable in this study is Biological Asset Disclosure (BAD), which refers to the extent of biological asset disclosure is measured using a disclosure index based on 40 disclosure items derived from PSAK 69. A dichotomous scoring method is applied to assess each item disclosed in the company's audited financial statements Carolina & Kusumawati (2020) and Zufriya et al. (2020). A score of 1 is assigned to each item disclosed, while a score of 0 is assigned to each item not disclosed. The disclosure index is calculated using the Wallace Index formula in Equation 1 (Eq. 1).

$$Biological\ Asset\ Disclosure = \frac{Total\ Disclosed\ Items}{40} \times 100\% \quad \text{(Eq. 1)}$$

A higher index indicates a greater extent of biological asset disclosure in the company's audited financial statements. The complete list of the 40 disclosure items and their corresponding PSAK 69 paragraph references is provided in Appendix A

Biological assets intensity

Biological asset intensity refers to the proportion of biological assets in the total investment in the agricultural-product companies. It indicates the company's level of dependence on biological assets (Alfiani & Rahmawati, 2019). The measurement of biological asset intensity is in Equation 2 (Eq. 2).

$$Biological\ Asset\ Intensity = \frac{Biological\ Assets}{Total\ Assets} X100\% \quad \text{(Eq. 1)}$$

Firm size

According to Harahap (2007: 23), firm size can be measured using total assets' natural logarithm (Ln). The use of total assets reflects the overall scale of the company. Firm size is calculated using the Equation 3 (Eq. 3).

$$Firm\ Size = Ln\ (Total\ Assets) \quad \text{(Eq. 3)}$$

Managerial ownership

Managerial ownership refers to the proportion of shares owned by key leaders and decision-makers within a company compared to the total outstanding shares (Sartono, 2010). The measurement formula is in Equation 4 (Eq. 4).

$$Managerial\ Ownership = \frac{Total\ Shares\ Owned\ by\ Management}{Total\ Outstanding\ Shares} \quad \text{(Eq. 4)}$$

Type of auditor

The type of auditor is a dummy variable, where 1 represents clients audited by Big Four-affiliated public accounting firms and 0 represents clients audited by non-Big Four public accounting firms.

Leverage

Leverage is a ratio used to measure the extent to which a company's assets are financed by debt. This ratio indicates the proportion of debt to equity used by the company to operate (Kasmir, 2022). Leverage is measured using the Equation 5 (Eq. 5).

$$Debt\ to\ Asset\ Ratio = \frac{Total\ Debt}{Total\ Assets} \quad \text{(Eq. 5)}$$

Profitability

Return on Assets (ROA) is a ratio that measures a company's ability to generate profit from its total assets. A high ROA indicates the company's efficiency in utilizing its assets to generate profit (Hanafi & Halim, 2016). The ROA is calculated using the Equation 6 (Eq. 6).

$$Return\ on\ Assets\ (ROA) = \frac{Net\ Income\ After\ Tax}{Total\ Assets} \quad \text{(Eq. 5)}$$

4. Results

Descriptive Analysis

The descriptive analysis of the research data is presented in Table 1. The biological asset disclosure (mean = 51.20%, SD = 3.52%), firm value (mean = 27.50, SD = 4.80), and leverage (mean = 0.60, SD =

0.30) have low variability. Firm size is measured as the natural logarithm of total assets, with all asset values denominated in Indonesian Rupiah (IDR). For companies presenting their financial statements in USD, total assets are converted into IDR using the applicable exchange rate at the respective reporting date before calculating the natural logarithm. Firm size spans from a minimum value of 14.48 (total assets worth USD 1,946,438) and a maximum value of 31.38 (total assets worth IDR 35,026,171,000,000 = USD 2,275,946,220) (based on exchange rate at the end of 2024: USD 1 equals to IDR 15,39).

In contrast, other variables tend to have higher variability. The intensity of biological assets (mean = 2.60, SD = 2.70) has a maximum value of 15.04 percent, while at the same time, it has a minimum value of 0 percent, indicating that some companies have completely sold their biological assets after harvest, leaving no remaining ones. This is similar to the data on managerial ownership (mean = 6.80%, SD = 17.30%), with a maximum value of 81.24 percent and a minimum value of 0.00 percent. Leverage (mean = 0.60%, SD = 0.30%) and profitability (mean = 0.02%, SD = 0.10%) data also have high variability. Regarding the type of public accounting firm (PAF), the frequency distribution shows that 76 firm-year observations (55 percent) were audited by Big Four accounting firms, while the remaining 61 observations (45 percent) were audited by non-Big Four accounting firms. This indicates that the majority of the observed companies were audited by Big Four accounting firms.

Regarding the choice of methodology, the Pooled Ordinary Least Squares (OLS) model is considered appropriate for the study, provided that several diagnostic and statistical adjustments are applied. First, the data structure is clarified by reporting the number of unique firms and annual observations collected between 2019 and 2024. Second, firm-clustered standard errors are employed to account for potential within-firm residual correlation arising from repeated observations. Third, year fixed effects are included to control for common time-related factors, such as macroeconomic fluctuations, institutional changes, and pandemic-related shocks. Finally, an econometric justification for using Pooled OLS is provided, along with an explanation of how the model accounts for repeated observations within firms.

Classical Assumption Test

The normality test using the Kolmogorov-Smirnov method shows a significance value of 0.200, greater than 0.05. Therefore, the residual data in this regression model are normally distributed.

Furthermore, the analysis of this regression model shows no serious multicollinearity issues. The multicollinearity test results indicate that all independent variables have tolerance values greater than 0.10 and VIF values below 10. Specifically, the tolerance values range from 0.766 to 0.975, while the VIF values range from 1.026 to 1.305. These results suggest that there is no evidence of problematic multicollinearity among the independent variables in the regression model. Therefore, all variables can be retained for further regression analysis.

Table 2. Descriptive statistics of the variables

Variables	N	Min	Max	Mean	SD
PAB	137	45.00	60.00	51.20	3.50
IAB	137	0.00	15.04	2.60	2.70
SIZE	137	14.48	31.38	27.50	4.80
OC	137	0.00	81.24	6.80	17.30
DAR	137	0.02	2.31	0.60	0.30
ROA	137	-0.58	0.49	0.02	0.10

Note: PAB = Biological asset disclosure; IAB = Biological asset intensity; SIZE = Firm size; OC = Managerial ownership; DAR = Leverage; ROA = Profitability

Table 3. Frequency distribution of Public Accounting Firm (PAF)

Public Accounting Firm	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Non-Big Four	61	45.0	45.0	45.0
Big Four	76	55.0	55.0	100.0
Total	137	100.0	100.0	–

The Durbin-Watson test is used to examine autocorrelation. The test results show a Durbin-Watson (d) value of 1.993 at a 5% significance level using the formula (K; N) with six independent variables, (K; N) = (6,137). This value is then compared to the Durbin-Watson table distribution, where the lower bound (dL) is 1.6306 and the upper bound (dU) is 1.8131. Since the Durbin-Watson (d) value of 1.948 is greater than dU and less than (4 - dU) = 4 - 1.8131 = 2.1869, it can be concluded that there is no autocorrelation issue.

This study employs the Breusch-Pagan Test (Glejser Test) to detect the presence of heteroscedasticity. The heteroscedasticity test results show that all independent variables have significance values greater than 0.05. Specifically, the significance values range from 0.070 to 0.900. These results indicate that none of the independent variables exhibits a statistically significant relationship with the absolute residuals. Therefore, the regression model does not show evidence of heteroscedasticity, suggesting that the homoscedasticity assumption is satisfied.

Multiple Linear Regression Test

The results of multiple linear regression are provided in Tables 4, 5, and 6. Table 4 indicates the results of the F-test, which generally suggests that the model is fit ($p < 0.001$). Further in Table 5, the adjusted R-square value is 0.161 (16 percent). This means that the independent variables in this study explain 16 percent of the variation in the dependent variable, while other factors outside the independent variables in this study explain the remaining 84 percent.

Based on the results in Table 6, the multiple linear regression model is formulated as in Equation 7 (Eq. 7).

$$PAB = 43.276 + 0.2021AB + 0.233SIZE + 0.0490C \quad 1.442PAF - 0.002DAR - 0.001\ ROA \qquad \text{(Eq. 7)}$$

The main hypothesis test is presented in Table 6. It suggests that biological asset intensity ($p = 0.051$), leverage ($p = 0.792$), and profitability ($p = 0.352$) do not affect the extent of biological asset disclosure. Differently, the results show support for

Table 4. Regression model test (F-Test)

Model	Sum of Squares	df	Mean Squares	F	Sig.
Regression	335.204	6	55.867	5.366	0,000
Residual	1353.573	130	10.412		
Total	1688.777	136			

Table 5. Coefficient of determination test (R^2 Test)

R	R-Square	Adjusted R Square	Std. Error of the Estimate
0.466	0.198	0.161	3.2268

Table 6. Multiple linear regression test

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	Beta	Std. Error			
(Constant)	43.276	1.798		24.069	0.000
BAI	0.202	0.103	0.156	1.966	0.051
SIZE	0.233	0.065	0.318	3.577	0.000
OC	0.049	0.018	0.243	2.779	0.006
PAF	1.442	0.634	0.204	2.275	0.025
DAR	-0.002	0.008	-0.023	-0.0264	0.792
ROA	-3.18E-5	0.000	-0.080	-0.989	0.352

Note: Dependent variable: Biological Asset Disclosure; IAB = Biological asset intensity; SIZE = Firm size; OC = Managerial ownership; PAF = Type of auditor; DAR = Leverage; ROA = Profitability

the prediction on the effect of firm size ($p < 001$), managerial ownership ($p = 0.006$), and type of auditor ($p = 0.025$), confirming the positive association of these variables with biological asset disclosure. Overall, these findings support for H_2, H_3, and H_4, but not for H_1, H_5, and H_6.

5. Discussion

The Effect of Biological Asset Intensity on the Disclosure of Biological Assets

The results indicate that biological asset intensity has no statistically significant effect on biological asset disclosure. Therefore, H_1 is not supported. One possible explanation is that the proportion of biological assets relative to total assets is relatively limited among the companies in the sample. The descriptive statistics show that biological asset intensity ranges from 0 to 15.04 percent, indicating that biological assets account for a relatively small proportion of total assets, even at the maximum observed value. Under these circumstances, variation in biological asset intensity may not be sufficient to explain differences in the extent of disclosure across companies.

In this study, the proportion of biological assets held by a company does not necessarily correspond to the extent of information disclosed about those assets. Disclosure practices may also depend on other factors, including company reporting policies, management decisions, and external monitoring. The result is consistent with Alfiani & Rahmawati (2019) and Ariyani & Hermanto (2023) who likewise found no significant effect of biological asset intensity on biological asset disclosure. It is also consistent with Altarawneh (2023) who suggests that the relationship between biological asset intensity and disclosure may differ according to the measurement method applied to biological assets. Taken together, these findings indicate that biological asset intensity alone may not adequately explain variations in disclosure practices among agricultural companies.

The Effect of Firm Size on the Disclosure of Biological Assets

The results show that firm size has a positive and statistically significant effect on biological asset disclosure, supporting H_2. In this study, it is indicated that larger companies tend to provide more extensive information about their biological assets than smaller companies. Larger companies generally have greater organizational resources, more advanced accounting systems, and better access to professional expertise, which may facilitate the preparation of comprehensive financial reports. They may also face greater scrutiny from investors, creditors, regulators, and other stakeholders, creating stronger incentives to provide transparent and detailed information.

The positive relationship between firm size and biological asset disclosure suggests that a company's reporting capacity and external accountability may be relevant to the extent of its disclosure. Larger companies may be better equipped to address the reporting requirements associated with biological assets and respond to stakeholders' information needs. This result is consistent with the findings of Ika et al. (2022) and Santoso & Handayani (2021), who also reported a positive relationship between firm size and biological asset disclosure. The present study, therefore, reinforces the relevance of firm size as a company characteristic associated with differences in biological asset reporting among Indonesian agricultural companies.

The Effect of Managerial ownership on the Disclosure of Biological Assets

The results indicate that managerial ownership has a positive and statistically significant effect on biological asset disclosure, supporting H_3. This finding suggests that companies with higher managerial ownership tend to disclose more information about their biological assets. When managers hold shares in the company, their interests may become more closely aligned with those of other shareholders, potentially encouraging decisions that support the company's long-term value and reputation. More extensive disclosure may also help demonstrate management's accountability and provide stakeholders with relevant information about the company's biological assets.

From an agency perspective, managerial share ownership may help align the interests of managers and shareholders by giving managers a direct financial stake in company performance. Such alignment may encourage managers to support more transparent reporting practices. Nevertheless, the relationship should not be interpreted as evidence that managerial ownership necessarily reduces information asymmetry in every company, as its effect may depend on the ownership structure and the broader governance environment.

The finding is consistent with Riski et al. (2019) and Aliffatun (2020), who reported a relationship

between managerial ownership and biological asset disclosure. The positive association identified in this study suggests that managerial ownership structure is a relevant factor in explaining disclosure practices. However, further studies could examine whether this relationship varies according to the level of managerial ownership or other corporate governance mechanisms.

The Effect of the Type of Auditor on the Disclosure of Biological Assets

The results reveal that auditor type has a positive and statistically significant effect on biological asset disclosure, supporting H_4. In particular, companies audited by Big Four-affiliated public accounting firms tend to provide more extensive biological asset disclosure than companies audited by non-Big Four firms. This finding may reflect differences in audit expertise, professional resources, audit methodologies, and reputational incentives. Big Four-affiliated firms generally operate within wider professional networks and may have access to specialized expertise relevant to complex accounting matters, including the recognition, measurement, and disclosure of biological assets.

Auditors may influence disclosure practices by evaluating whether financial statements comply with applicable accounting standards and by identifying areas where additional information may be required. In this context, audit quality and the scrutiny associated with the auditor's reputation may drive companies to provide more complete disclosures. Nevertheless, the results demonstrate an association between auditor type and disclosure rather than establishing that the appointment of a Big Four auditor directly causes more extensive disclosure.

This finding is consistent with Alfiani & Rahmawati (2019), who identified a relationship between public accounting firm type and biological asset disclosure. It also aligns with Suttipun (2022) and Al-mulla & Bradbury (2022), whose studies highlight the relevance of auditor characteristics and audit effort to corporate disclosure practices. Overall, the findings suggest that external auditing is an important factor to consider when examining the transparency of biological asset reporting among Indonesian agricultural companies.

The Effect of Leverage on the Disclosure of Biological Assets

The results indicate that leverage has no statistically significant effect on biological asset disclosure; therefore, H_5 is not supported. This finding suggests that differences in companies' reliance on debt do not consistently correspond to differences in the extent of their biological asset disclosure. While leverage can influence the relationship between a company and its creditors, the information demands associated with debt financing may not necessarily translate into more extensive disclosure of biological assets.

One possible explanation is that creditors' information requirements may focus primarily on a company's solvency, cash flows, collateral, and ability to meet its financial obligations. Consequently, leverage may not be a sufficiently strong determinant of disclosure practices relating specifically to biological assets. Companies with different debt levels may also adopt similar disclosure practices because they are subject to the same applicable accounting requirements. These considerations may help explain why leverage does not significantly account for variations in biological asset disclosure in the present sample.

The result is consistent with Ariyani & Hermanto (2023), who also found no significant relationship between leverage and biological asset disclosure. However, the lack of statistical significance should not be interpreted as evidence that creditors never influence corporate disclosure. Rather, the findings indicate that leverage, as measured in this study, does not provide sufficient statistical evidence to explain differences in biological asset disclosure. Further studies could examine whether creditor monitoring, debt covenants, or the nature of financing arrangements provides a more direct explanation of disclosure practices.

The Effect of Profitability on the Disclosure of Biological Assets

The results show that profitability has no statistically significant effect on biological asset disclosure; therefore, H6 is not supported. This finding indicates that more profitable companies do not necessarily disclose more information about their biological assets than less profitable companies. While profitability may reflect a company's financial performance, it does not necessarily determine the extent of information provided in its financial statements.

One possible explanation is that biological asset disclosure is influenced more directly by accounting requirements, reporting practices, and corporate governance arrangements than by short-

term financial performance. Companies may maintain similar disclosure practices regardless of their profitability because disclosure decisions are not determined solely by the level of profit earned. In addition, the costs and operational challenges associated with agricultural activities may vary across companies, making it difficult to conclude disclosure behavior from profitability alone. These explanations are possible interpretations of the findings rather than effects directly established by the regression results.

The result is consistent with Carolina & Kusumawati (2020) and Ika et al. (2022), who also found that profitability did not significantly influence biological asset disclosure. The evidence from this study therefore suggests that profitability, considered independently, may not be a sufficient explanation for differences in biological asset reporting among Indonesian agricultural companies. Further studies could investigate whether profitability interacts with other factors, such as firm size, auditor type, or corporate governance, in explaining disclosure practices.

3. Conclusion

This study examines the determinants of biological asset disclosure among agricultural product companies listed on the Indonesia Stock Exchange (IDX) during the 2019-2024 period. The findings reveal that firm size, managerial ownership concentration, and type of auditor have positive and statistically significant associations with the extent of biological asset disclosure. In contrast, biological asset intensity, leverage, and profitability are not significantly associated with biological asset disclosure.

These findings suggest that biological asset disclosure among Indonesian agricultural product companies is more closely associated with organizational characteristics and external monitoring mechanisms than with biological asset intensity or financial performance. The positive association between firm size and disclosure indicates that larger companies tend to provide more extensive information about their biological assets, potentially because they have greater resources and reporting capabilities. Similarly, the positive association with managerial ownership concentration suggests that managerial ownership may be related to greater transparency in corporate reporting. The positive association with type of auditor indicates that companies audited by Big Four accounting firms tend to disclose more information about their biological assets than those audited by non-Big Four firms.

Meanwhile, the insignificant results for biological asset intensity, leverage, and profitability suggest that disclosure practices are not necessarily determined by the proportion of biological assets held or by the company's financial condition. Overall, these findings highlight the relevance of organizational characteristics and external audit-related monitoring in understanding biological asset disclosure practices in Indonesia. They are also consistent with the agency theory perspective, which views corporate disclosure as a mechanism for reducing information asymmetry between management and stakeholders. Nevertheless, the findings represent statistical associations rather than causal relationships.

Several limitations should be considered when interpreting these findings. First, biological asset disclosure is measured using a 40-item index based on PSAK 69. However, certain disclosure items may not be universally applicable to all companies because of varying agricultural activities and the nature of their biological assets. Some requirements may also be applied conditionally upon specific circumstances. The use of a fixed 40-item denominator may therefore affect the comparability of disclosure scores across companies. Second, the study covers agricultural product companies operating in potentially different subsectors, whose operational characteristics and types of biological assets may influence their disclosure practices. However, this study does not separately examine differences across agricultural subsectors. Third, type of auditor is measured using Big Four affiliation as a proxy rather than a direct measure of audit quality. Therefore, the positive association found in this study should not be interpreted as direct evidence that Big Four affiliation represents higher audit quality. Fourth, managerial ownership concentration is examined using a linear specification, which does not capture the possibility of a non-linear relationship between managerial ownership and biological asset disclosure.

Future studies could address these limitations by transforming the 40-item disclosure index in order to distinguish applicable requirements from items that are not relevant to particular companies, and by examining disclosure practices across different agricultural subsectors. In addition, more direct measures of audit quality could be employed to investigate the potential non-linear relationship

between managerial ownership concentration and biological asset disclosure. Extending the observation period and including companies from other countries or institutional environments are also encouraged to provide deeper insights into the determinants of biological asset disclosure.

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