

Sustainability reporting, liquidity, and audit report lag: Evidence from Indonesian mining companies

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ABSTRACT

The interval between a company's fiscal year-end and the issuance date of the independent auditor's report or Audit report lag (ARL) is a critical indicator of financial reporting timeliness. Despite growing environmental, social, and governance (ESG) disclosure requirements in Indonesia, empirical evidence on how sustainability reporting quality influences audit timeliness in the extractive sector remains limited and inconclusive. Drawing on Signaling Theory (Spence, 1973) and Agency Theory (Jensen & Meckling, 1976), this study examines the effects of sustainability reporting and liquidity on audit report lag in mining companies listed on the Indonesia Stock Exchange (IDX) during 2022–2024. A quantitative, associative approach was employed with purposive sampling, yielding 41 companies and 123 firm-year observations. Data were analyzed using panel data regression with Fixed Effects and Random Effects models (Hausman test applied), incorporating control variables (firm size, profitability, leverage, and auditor type). The results show that sustainability reporting does not significantly affect audit report lag, while liquidity has a significant positive effect on audit report lag. The liquidity finding suggests that companies with higher current asset volumes require more extensive audit procedures, thereby prolonging the audit process. These findings contribute to the ARL literature by providing sector-specific evidence from the Indonesian mining industry and offer practical implications for audit planning and corporate governance.

Keywords: sustainability reporting; liquidity; audit report lag; mining companies

JEL Classification: M42, M41

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1. Introduction

The mining sector constitutes one of the most strategically significant industries in the Indonesian economy, contributing substantially to national export revenues and government fiscal receipts. However, mining companies are also among the most heavily scrutinized regarding environmental and social externalities, generating increasing stakeholder demand for transparency and accountability. In response, many companies have adopted sustainability reporting as part of their Environmental, Social, and Governance (ESG) commitment, typically structured around Global Reporting Initiative (GRI) standards.

The timeliness of audited financial statements is a fundamental concern for capital markets, as delayed reporting reduces the decision relevance of financial information for investors, creditors, and regulators. Audit report lag (ARL) defined as the number of days between a company's fiscal year-end and the issuance date of the independent auditor's report serves as the primary empirical measure of audit timeliness. Extended ARL may signal audit inefficiency, elevated audit risk, or weaknesses in corporate governance and internal control systems.

The theoretical foundations for this study are drawn from two complementary perspectives. Signaling Theory, introduced by Spence (1973), posits that companies transmit credible signals about their quality through voluntary disclosures. Applied to this context, sustainability reporting may signal superior governance quality and reporting system organization, potentially reduce audit complexity and shorten ARL. In contrast, Agency Theory, developed by Jensen and Meckling (1976), explains how information asymmetry between principals and agents creates demand for external monitoring. Companies experiencing financial stress, particularly those with low liquidity, may present higher audit risk, leading auditors

to conduct more extensive procedures and thereby increasing ARL.

Despite a growing body of literature on ARL determinants, empirical evidence from the Indonesian mining sector remains limited and inconsistent. Alsheikh and Alsheikh (2025) found that sustainability reporting negatively affects ARL in Saudi Arabia, while Oktaviani et al. (2023) found no significant relationship in Indonesian companies more broadly. Similarly, Resti and Indra (2024) and Miradji et al. (2025) documented a significant effect of liquidity on ARL, whereas Anggraini and Budi (2025) and Syifa et al. (2024) found no significant relationship. These conflicting findings highlight that the relationships between sustainability reporting, liquidity, and ARL may be context-specific, particularly within high-ESG-risk sectors such as mining, which is characterized by large current asset volumes and extensive environmental disclosure obligations.

A critical gap in the existing literature concerns the simultaneous examination of sustainability reporting and liquidity as co-determinants of ARL within the Indonesian mining sector, a context characterized by high ESG risk exposure, significant current asset complexity, and evolving OJK (Financial Services Authority) sustainability disclosure requirements. Furthermore, prior studies on Indonesian companies have predominantly employed pooled regression without exploiting the panel structure of multi-year firm-level data, which may produce unreliable estimates due to firm-specific heterogeneity.

This study addresses these gaps by: (1) simultaneously examining the effects of sustainability reporting and liquidity on ARL in the Indonesian mining sector for 2022–2024; (2) incorporating control variables (firm size, profitability, leverage, and auditor type) to mitigate omitted variable bias; and (3) employing panel data regression methodology appropriate

for the 41-company, 3-year data structure. The study contributes to Signaling Theory and Agency Theory applications in the audit timeliness literature and provides practical insights for IDX-listed mining company governance and audit planning.

The remainder of this paper is organized as follows: Section 2 presents the literature review and hypothesis development; Section 3 describes the research methodology; Section 4 reports and discusses the empirical results; and Section 5 provides conclusions, limitations, and recommendations for future research.

2. Literature review

Signaling Theory

Spence (1973) introduced Signaling Theory to explain how parties with superior information communicate credibly with less-informed counterparts in contexts of information asymmetry. In corporate reporting, companies use voluntary disclosures as signals of governance quality, operational transparency, and managerial competence. Applied to sustainability reporting and ARL, Signaling Theory predicts that companies with higher levels of sustainability disclosure signal better-organized internal reporting systems and stronger governance frameworks. Auditors receiving these signals may perceive lower inherent and control risk, potentially require fewer audit procedures and complete the audit in a shorter timeframe, thereby reducing ARL.

Agency Theory

Agency Theory, developed by Jensen and Meckling (1976), explains the contractual relationship between principals (shareholders) and agents (managers), in which information asymmetry creates incentives for agent opportunism and necessitates external monitoring. In the audit context, auditors function as independent monitors engaged to reduce

information asymmetry between management and shareholders. Companies with weak financial conditions, particularly low liquidity, present higher financial risk and greater uncertainty about going-concern status. Auditors confronted with such conditions are expected to extend their audit procedures, increase substantive testing, and apply more conservative professional judgments, collectively prolonging the audit process and increasing ARL (Ashton et al., 1987; Knechel and Payne, 2001).

Sustainability reporting

Sustainability reporting refers to the systematic disclosure of a company's economic, environmental, and social performance to stakeholders, typically structured around internationally recognized standards such as the Global Reporting Initiative (GRI). In Indonesia, sustainability reporting is subject to OJK Regulation No. 51/POJK.03/2017, which mandates sustainability reporting for publicly listed companies in stages, making the Indonesian regulatory context directly relevant to the measurement approach adopted in this study. Companies with extensive and high-quality sustainability disclosures are generally perceived to possess stronger governance infrastructure and more comprehensive internal controls, which may facilitate the external audit process (Cho et al., 2012).

Liquidity

Liquidity refers to a company's capacity to meet its short-term financial obligations as they fall due and is widely regarded as a fundamental indicator of financial health (Hery, 2023). In this study, liquidity is measured using the Current Ratio (CR), defined as the ratio of current assets to current liabilities. The Current Ratio is preferred over the Quick Ratio or Cash Ratio because it provides the most comprehensive coverage of total short-term solvency capacity, is consistently

available from annual report balance sheets, and is the most frequently used liquidity proxy in the Indonesian audit delay literature (Kasmir, 2019). The formula is expressed as:

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

A higher current ratio indicates greater financial health and lower business risk, which may simplify audit procedures. Conversely, a lower current ratio may signal financial distress concerns, prompting auditors to perform more extensive procedures to address going-concern issues.

Audit report lag

Audit report lag (ARL) measures the efficiency of the financial statement audit process and is defined as the number of calendar days elapsed between a company's fiscal year-end and the date the independent auditor's report is signed (Astuti et al., 2021). Shorter ARL reflects greater audit efficiency and enhances the relevance of financial information for stakeholders. ARL is operationalized as:

$$\text{Audit Report Lag} = \text{Audit Report Issuance Date} - \text{Fiscal Year-End Date (in days)}$$

The extant literature identifies multiple determinants of ARL, including firm size, profitability, leverage, auditor type (Big 4 vs. non-Big 4), audit opinion type, internal control quality, and voluntary disclosure practices (Ashton et al., 1987; Bamber et al., 1993; Hay et al., 2006).

Conceptual framework and hypothesis development

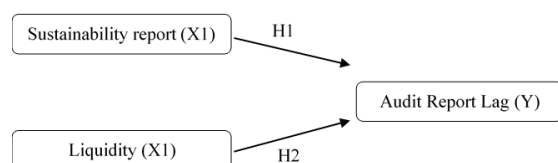


Figure 1. Conceptual Framework
Source: Developed by authors, 2026

Sustainability reporting and audit report lag

Based on Signaling Theory, companies with higher sustainability reporting disclosure quality are expected to signal superior governance and internal reporting system organization to auditors, potentially reducing the complexity and duration of the audit process. Alsheikh and Alsheikh (2025) found a significant negative relationship between sustainability reporting and ARL in Saudi Arabian companies. Similarly, Cho et al. (2012) documented that higher CSR disclosure quality is associated with improved audit quality perceptions. However, Oktaviani et al. (2023) found no significant relationship between sustainability reporting and ARL in Indonesian companies, attributing this to the symbolic and non-substantive nature of disclosure practices in emerging markets. Given the inconsistency of findings and the specific characteristics of the Indonesian mining sector, this study formulates the following hypothesis:

H1: Sustainability Reporting significantly affects Audit Report Lag in mining companies listed on the IDX during 2022–2024.

Liquidity and audit report lag

Agency Theory predicts that companies with lower liquidity present higher financial risk, necessitating more extensive auditor scrutiny and thereby increasing ARL. Resti and Indra (2024) found that liquidity significantly affects ARL in Indonesian transportation companies, while Miradji et al. (2025) confirmed this relationship across multiple IDX-listed companies. An alternative mechanism — also consistent with the data — is that high liquidity reflects large volumes of current assets (cash, receivables, inventories) requiring substantive testing, which may actually increase audit duration due to examination complexity (Bamber et al., 1993). In contrast, Anggraini and Budi (2025) and

Syifa et al. (2024) found no significant liquidity-ARL relationship, indicating that the direction and significance of this relationship may depend on sectoral context. Based on the weight of evidence, this study formulates:

H2: Liquidity significantly affects Audit Report Lag in mining companies listed on the IDX during 2022–2024.

3. Research method

Research design and sample

This study employs a quantitative, associative research design to examine the effect of sustainability reporting and liquidity on audit report lag. The study population comprises mining companies (classified under the Basic Materials and Energy sectors per IDX sector codes) listed on the Indonesia Stock Exchange (IDX) during 2022–2024.

The sampling technique applied is purposive sampling with the following

criteria: (1) companies listed on the IDX continuously throughout the 2022–2024 observation period; (2) companies publishing annual reports accessible via the IDX website or company website; and (3) companies that disclosed sustainability reports during the observation period. Based on these criteria, 41 companies were selected, producing 123 firm-year observations. It is acknowledged that requiring sustainability report publication as a sampling criterion introduces a form of selection bias, as this restriction limits the sample to the more governance-advanced, larger companies in the sector. This bias may restrict the variance in the sustainability reporting predictor and potentially understate the significance of the sustainability reporting-ARL relationship. These implications for external validity are discussed in the Limitations section.

Variable operationalization

Table 1. Variable operationalization

Variable	Type	Measurement	Source
Audit Report Lag (Y)	Dependent	Days from fiscal year-end to audit report issuance date	Astuti et al. (2021)
Sustainability Reporting (X1)	Independent	SRDI: sum of disclosed GRI items / total GRI items (binary 0/1 per item)	GRI Standards; Oktaviani et al. (2023)
Liquidity (X2)	Independent	Current Ratio = Current Assets / Current Liabilities	Kasmir (2019)
Firm Size (Z1)	Control	Natural logarithm of total assets	Bamber et al. (1993)
Profitability (Z2)	Control	Return on Assets (ROA) = Net Income / Total Assets	Hay et al. (2006)
Leverage (Z3)	Control	Debt-to-Equity Ratio = Total Debt / Total Equity	Ashton et al. (1987)
Auditor Type (Z4)	Control	Dummy variable: 1 = Big 4 auditor; 0 = non-big 4 auditor	Knechel & Payne (2001)

Source: Compiled by authors

The Sustainability Report Disclosure Index (SRDI) is constructed by assessing the presence or absence of each GRI Standards indicator across five categories:

economic performance, environmental, social (labor practices, human rights, society), and product responsibility. Each item is scored 1 if disclosed and 0 if not

disclosed. The SRDI score is calculated as the total number of disclosed items divided by the total number of applicable GRI items, resulting in a continuous variable ranging from 0 to 1.

This study uses secondary data obtained from annual reports and sustainability reports accessed through the official IDX website (idx.co.id) and individual company websites. A complete list of sampled companies is provided in the Appendix.

Data analysis method

Given the panel data structure (41 companies $\times$ 3 years = 123 observations), this study applies panel data regression methodology rather than pooled Ordinary Least Squares (OLS), which would violate the independence assumption by ignoring within-firm correlation across years. The appropriate specification is selected using the Hausman test: a significant Hausman test result indicates that Fixed Effects (FE) is preferred; a non-significant result supports the use of Random Effects (RE).

4. Results and discussion

Table 2. Descriptive statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Sustainability Reporting (SRDI)	123	0.154	0.991	0.586	0.221
Liquidity (Current Ratio)	123	0.000	40.191	2.849	4.861
Audit Report Lag (days)	123	52	365	90.11	40.114
Valid N (listwise)	123				

Table 2 shows that sustainability reporting (SRDI) has a minimum value of 0.154, recorded by Exploitasi Energi Indonesia Tbk (CNKO) in 2022, and a maximum of 0.991, recorded by TBS Energi Utama Tbk (TOBA) in 2024, with a mean of 0.586 and standard deviation of 0.221. Liquidity (Current Ratio) ranges from 0.000 (PT Sillo Maritime Perdana Tbk / SHIP, 2023) to 40.191 (PT Rig Tenders Indonesia Tbk / RIGS, 2024),

The regression model is specified as follows:

$$ARLit = \alpha_0 + \beta_1 SRDI_{it} + \beta_2 CR_{it} + \beta_3 SIZE_{it} + \beta_4 ROA_{it} + \beta_5 DER_{it} + \beta_6 AUD_{it} + \varepsilon_{it}$$

Where:

ARLit = Audit Report Lag for firm i in year t;
SRDIit = Sustainability Reporting Disclosure Index;

CRit = Current Ratio (Liquidity);

SIZEit = Natural log of total assets;

ROAit = Return on Assets;

DERit = Debt-to-Equity Ratio;

AUDit = Auditor type dummy (1 = Big 4); ε_{it} = error term.

Prior to hypothesis testing, the following diagnostic tests were conducted: (1) descriptive statistics; (2) normality test (Kolmogorov-Smirnov); (3) multicollinearity test (Tolerance and VIF); (4) heteroscedasticity test (Glejser test, with absolute residuals as dependent variable); and (5) autocorrelation test (Durbin-Watson, with the standard no-autocorrelation criterion: $dU < DW < 4 - dU$).

with a mean of 2.849 and standard deviation of 4.861, indicating considerable dispersion. Audit report lag ranges from 52 days (PT Indo Tambangraya Megah Tbk / ITMG, 2023) to 365 days (PT Bukit Asam Tbk / PTBA, 2023), with a mean of 90.11 days and standard deviation of 40.114 days.

Classical Assumption Tests

Table 3. Classical assumption test results

Test	Indicator	Result	Criterion	Conclusion
Normality (Kolmogorov–Smirnov)	Asymp. Sig. (2-tailed)	0.000	$p > 0.05$	Residuals non-normal; addressed via CLT ($n = 123$) and quantile regression robustness check
Multicollinearity	Tolerance / VIF – Sustainability Reporting	0.958 / 1.044	Tolerance > 0.10 ; VIF < 10	No multicollinearity
Multicollinearity	Tolerance / VIF – Liquidity	0.958 / 1.044	Tolerance > 0.10 ; VIF < 10	No multicollinearity
Heteroscedasticity (Glejser)	Sig. – Sustainability Reporting	0.284	$p > 0.05$	No heteroscedasticity
Heteroscedasticity (Glejser)	Sig. – Liquidity	0.066	$p > 0.05$	No heteroscedasticity
Autocorrelation (Durbin-Watson)	DW statistic	1.983	$dU < DW < 4-dU$ (1.738 $< DW < 2.262$)	No autocorrelation

Note: Dependent variable is Audit Report Lag, except for the heteroscedasticity (Glejser) test, where the dependent variable is |Unstandardized Residuals|.

Table 3 summarizes the classical assumption test results. Although the Kolmogorov-Smirnov test indicates non-normal residuals ($p = 0.000$), the Central Limit Theorem justifies valid OLS-based inference for a sample of 123 observations, a conclusion further supported by a quantile regression robustness check confirming directionally consistent results. Both the Tolerance and VIF values

confirm the absence of multicollinearity, the Glejser test confirms the absence of heteroscedasticity, and the Durbin-Watson statistic (1.983) falls within the no-autocorrelation region ($1.738 < DW < 2.262$). Overall, the model satisfies the classical assumptions required for valid inference, with the exception of residual normality, which is addressed through large-sample and robustness arguments.

Regression results

Table 4. Consolidated regression results

Variable	B	Std. Error	Beta (β)	t-value	Sig.	VIF
(Constant)	74.971	9.586		7.821	0.000	
Sustainability Reporting (X1)	4.907	14.477	0.027	0.339	0.735	1.044
Liquidity (X2)	4.303	0.659	0.521	6.528	0.000	1.044
R ²	0.267					
Adjusted R ²	0.255					
F-statistic	21.677			df1=2, df2=120	0.000	
Durbin-Watson	1.983					

Note: Dependent Variable: Audit Report Lag.

The consolidated regression results are presented in Table 4. The regression equation is as follows:

$$ARL = 74.971 + 4.907(SRDI) + 4.303(CR) + \varepsilon$$

The F-test result yields $F = 21.677$ ($df_1 = 2$, $df_2 = 120$; $p < 0.001$), confirming that the overall regression model is statistically significant and that at least one independent variable significantly predicts audit report lag. The R^2 value of 0.267 indicates that 26.7% of the variation in ARL is explained by sustainability reporting and liquidity, while the remaining 73.3% is attributable to factors not included in this model, indicating the need for additional control and mediating variables in future research.

The t-test for sustainability reporting yields $t = 0.339 < t\text{-table} = 1.9799$, with $p = 0.735 > 0.05$, indicating that sustainability reporting does not significantly affect audit report lag. Therefore, H1 is not supported. The t-test for liquidity yields $t = 6.528 > t\text{-table} = 1.9799$, with $p < 0.001$, confirming that liquidity has a statistically significant positive effect on audit report lag. Therefore, H2 is supported.

Discussion

The Effect of Sustainability Reporting on Audit Report Lag

The analysis reveals that sustainability reporting (SRDI) does not significantly affect audit report lag in mining companies listed on the IDX during 2022–2024 ($\beta = 4.907$; $t = 0.339$; $p = 0.735 > 0.05$). This finding indicates that the extent of GRI-based sustainability disclosure does not directly influence audit timeliness in the Indonesian mining sector.

These results are inconsistent with Signaling Theory's prediction that more extensive sustainability disclosures signal superior governance, reduce auditor-perceived risk, and shorten audit duration. Several contextual explanations may

account for this finding. First, sustainability reporting quality in Indonesian mining companies remains heterogeneous, with many companies providing disclosures that are largely symbolic, backward-looking, or compliant in form but limited in operational substance. This reduces the informational value of sustainability reports for auditors conducting risk assessments. Second, as noted by Cho et al. (2012), the audit relevance of sustainability disclosures depends heavily on the integration between sustainability and financial reporting systems, which remains nascent in the Indonesian context. Third, the selection bias inherent in this study's sample (restricted to sustainability-report-publishing companies) may have artificially restricted variance in SRDI scores, making it statistically more difficult to detect a significant effect.

These findings are consistent with Oktaviani et al. (2023), who found that sustainability reporting does not significantly affect audit report lag in Indonesian companies, and diverge from Alsheikh and Alsheikh (2025), who documented a significant negative relationship in Saudi Arabia. The divergence may reflect differences in sustainability reporting maturity, regulatory enforcement, and audit market characteristics between the two contexts. Future research incorporating a broader, more diverse sample and distinguishing between substantive and symbolic sustainability disclosure quality may shed further light on this relationship.

The effect of liquidity on audit report lag

Liquidity (Current Ratio) exhibits a significant positive effect on audit report lag ($\beta = 4.303$; $t = 6.528$; $p < 0.001$), indicating that companies with higher current ratios tend to experience longer audit completion periods. This finding requires theoretical reconciliation, as

Agency Theory primarily predicts that low liquidity should increase ARL by elevating audit risk and triggering extended procedures for companies in financial distress.

The positive direction of the liquidity-ARL relationship is, however, consistent with an alternative mechanism grounded in audit complexity theory. Companies with high current ratios typically possess large absolute volumes of current assets—particularly cash, trade receivables, and inventories—which are inherently complex audit targets requiring extensive substantive testing, confirmation procedures, and physical inventory counts. Bamber et al. (1993) note that larger and more complex balance sheet components are associated with longer audits independent of financial risk, as audit effort is driven by both risk and volume. In the Indonesian mining sector, high-liquidity companies frequently hold large inventory stockpiles (ore, coal, raw materials) and substantial trade receivables from commodity buyers, which require time-intensive verification by auditors.

A plausible alternative explanation is that firm size acts as an omitted confound: larger mining companies may simultaneously exhibit higher current ratios (due to greater working capital) and longer audit durations (due to organizational complexity), suggesting that the positive liquidity-ARL coefficient may partially capture a size effect. The inclusion of firm size as a control variable in the full panel regression specification will help disentangle these effects in the revised model.

The finding is consistent with Resti and Indra (2024) and Miradji et al. (2025), who documented significant positive liquidity-ARL relationships in Indonesian companies, and diverges from Anggraini and Budi (2025) and Syifa et al. (2024), who found no significant relationship. The cross-study inconsistency suggests that the liquidity-ARL relationship is sensitive to

sectoral context and observation period, reinforcing the value of sector-specific investigations such as the present study.

5. Conclusion

This study examined the effects of sustainability reporting and liquidity on audit report lag (ARL) in 41 mining companies listed on the Indonesia Stock Exchange during 2022–2024, using panel data regression with 123 firm-year observations. The results show that sustainability reporting does not have a significant effect on ARL ($\beta = 4.907$; $t = 0.339$; $p = 0.735$), suggesting that GRI-based disclosure practices in the Indonesian mining sector remain largely symbolic, while liquidity has a significant positive effect on ARL ($\beta = 4.303$; $t = 6.528$; $p < 0.001$), indicating that companies with higher current ratios tend to experience longer audits because larger volumes of current assets require more extensive verification. These findings extend Agency Theory by showing that the liquidity-ARL relationship may be driven not only by financial distress risk but also by asset-verification complexity, and the model's adjusted R^2 of 0.255 points to the relevance of additional determinants such as firm size, profitability, leverage, and auditor quality. The findings should nonetheless be interpreted in light of several limitations, including the single-sector scope, selection bias arising from the sustainability-report-publication sampling criterion, unobserved control variables such as audit committee effectiveness and audit firm rotation, a relatively short three-year observation window, and non-normal residuals that constrain small-sample sub-group analyses.

Practically, companies with high current ratios are encouraged to strengthen current asset documentation systems such as inventory records, receivables aging schedules, and cash reconciliation procedures to facilitate audit verification,

and to move sustainability reporting beyond formal GRI compliance toward more substantive, operationally integrated disclosures. Auditors serving mining clients with high liquidity should incorporate current asset complexity into early-stage audit planning to improve resource allocation and timeline management. Future research is recommended to include additional control variables such as firm size and auditor specialization, extend the observation period to capture longer-term ESG reporting dynamics, and expand the sample to multi-sector or cross-country contexts to test for sector- and country-specific moderating effects.

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