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INDEPENDENT AND JOINT EFFECTS OF CARBON PERFORMANCE AND FAMILY OWNERSHIP ON FINANCIAL REPORTING QUALITY

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Abstract. This study examines the individual and joint impact of carbon emission disclosure and family ownership on audit report lag using data from 124 non-financial firms listed on the Indonesia Stock Exchange (IDX) from 2017 to 2019. Findings show that greater carbon emission disclosure reduces audit report lag, leading to higher financial reporting quality. Conversely, family-controlled firms tend to have longer audit report lag, as external auditors perceive them as having higher audit risks. The interaction between carbon performance and family ownership also contributes to delays in audit reporting. Additionally, family members in supervisory roles lead to increased audit report timeliness, negatively impacting financial reporting quality. Next, the effects of carbon performance and family firms on audit report lag remain statistically significant for companies in high-profile industries. Furthermore, analysis of endogeneity confirms the credibility of the factors influencing audit report lag. The study highlights the importance of carbon disclosure in environmental and financial reporting, while family-owned businesses may struggle with audit deadlines due to their unique characteristics. Recognizing these obstacles can help auditors and regulators tailor their approaches when auditing family-owned enterprises to ensure timely reporting. This research contributes to the literature by exploring the relationship between carbon disclosure, family ownership, and audit report completion time, emphasizing the need to integrate environmental factors into financial reporting practices.

Keywords: carbon emission disclosure, family ownership, financial reporting quality, Indonesia.

JEL Classification: M14, M40, M42.

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1. Introduction

This study examines the influence of carbon emission disclosure and family ownership on audit report lag (ARL). Additionally, it investigates the combined, or joint impact, of these two factors on the timeliness of audit reports. The timely issuance of audited financial statements is critical to corporate governance and financial reporting. As a reliable source of accounting information, these statements are vital for external users, including investors, creditors, and other stakeholders, who depend on them for informed decision-making (Alkhatib & Marji, 2012). The relevance of financial reports, as emphasized in the Conceptual Framework for Financial Reporting, is directly tied to their timeliness and accuracy (Alfredson et al., 2009). A key metric for assessing this timeliness is the audit report lag, defined as the period between a company's fiscal year-end and the date its audit report is released (Abernathy et al., 2017; Oh & Jeon, 2022; Astami et al., 2024). In accounting literature, a shorter ARL is a widely recognized indicator of high-quality financial reporting. Conversely, delays in issuing audit reports can hinder stakeholders' ability to make timely and well-informed decisions (Durand, 2019). Furthermore, the delay in audit report submission may signal potential issues with a firm's internal controls and overall governance, underscoring the importance of assessing the quality of financial reporting processes (Abernathy et al., 2017).

Research on the determinants of ARL has traditionally focused on firm characteristics, corporate governance, and audit-related factors (Habib et al., 2019). However, a significant gap in the literature regarding the interplay between a firm's corporate environmental performance (specifically, carbon emission disclosure) and its ownership structure, particularly in family-owned firms, in predicting ARL. Addressing this research gap is essential for several

reasons. First, it deepens our understanding of the complex relationship between a company's sustainability practices and financial reporting timeliness, contributing to a more comprehensive view of corporate accountability. This knowledge can lead to more informed decision-making and improved sustainability strategies within the business world. Second, it acknowledges the unique dynamics of family-owned businesses, which often have distinct governance structures and decision-making processes that could influence their ability to meet audit deadlines. Finally, this study directly responds to the call for further investigation by Habib et al. (2019), who specifically recommended future research on ARL in family-controlled firms, recognizing the inherent complexities and challenges in auditing such entities.

Indonesia provides a compelling and highly relevant context for this study. As a developing economy with a substantial population, Indonesian corporations face intense scrutiny regarding carbon management strategies (Chariri et al., 2019). The government has committed to a 29% reduction in greenhouse gas emissions by 2030 and has implemented regulations to curb carbon emissions, particularly within the manufacturing sector (Rokhmawati, 2020). Beyond regulatory pressure, companies are also responding to increasing demands from consumers and investors who prioritize social and environmental responsibility (Rahmaniati & Ekawati, 2024; Brînzea et al., 2014). This shift towards greater transparency in sustainable practices underscores the importance of corporate environmental responsibility for a company's long-term viability and public reputation. Furthermore, family-owned businesses are pivotal to the Indonesian economy, contributing significantly to its growth and employment (Claessens et al., 2006). A substantial 73% of companies in Indonesia are family-owned, contributing 25% to the country's GDP and creating numerous jobs (Claessens et al., 2006; PriceWaterhouseCoopers, 2018). Indonesia's unique institutional and governance environment, marked by historical corporate failures during the 1997 Asian crisis and the prevalence of politically connected firms (Chaney et al., 2011; Wijayati et al., 2016), adds another layer of complexity. These factors can significantly influence a company's operational effectiveness, financial reporting integrity, and, by extension, its audit process.

The literature presents a mixed perspective on how corporate social responsibility (CSR), which includes environmental performance and family ownership, might affect ARL. Some argue that CSR adds complexity to financial reporting, potentially prolonging the audit process and increasing ARL due to heightened auditor risk (Garcia et al., 2020; Lamptey et al., 2023). Conversely, others contend that a company's commitment to transparency in CSR practices can enhance investor confidence, reduce information asymmetry, and potentially shorten the audit duration by mitigating perceived risks (Oh & Jeon, 2022). Similarly, the impact of family ownership on audit timeliness is not straightforward. While some views suggest that family firms may have different governance incentives that could lead to more efficient audits, others argue that they are more prone to agency conflicts (e.g., Bubolz, 2001; Villalonga & Amit, 2006; Cascino et al., 2010; Salvato & Moores, 2010). These conflicts arise from a potential misalignment of interests between family management and minority shareholders, which could increase audit risk and, consequently, the time required for audit procedures. The conflicting viewpoints in the literature highlight the need for empirical evidence to clarify the relationship between these variables and ARL.

Our study offers a novel contribution to the existing literature by exploring the combined effects of carbon emission disclosure and family ownership on ARL. This relationship has been largely overlooked. Thus, in addition to examining the individual impact of carbon emission and family firm on ARL, we specifically investigate how family ownership may moderate the association between environmental performance and audit timeliness. Therefore, we pose the following research questions:

1. To what extent are corporate environmental performance and family-controlled firms individually associated with ARL?
2. To what extent do family-controlled firms moderate the association between corporate environmental performance and ARL?

By addressing these questions within the unique Indonesian context, this study will provide valuable insights for policymakers, investors, and auditors on the factors influencing the quality and timeliness of corporate financial reporting. It will help bridge a crucial literature gap and contribute to a more nuanced understanding of corporate accountability in a rapidly evolving global business environment.

The structure of this paper is as follows. The next section presents a literature review and outlines the research hypotheses. Subsequently, Section 3 describes the sample, data, and methodology utilized. Section 4 discusses the findings, including the tests and analyses performed. Finally, the conclusion is presented in the last section.

2. Literature review and hypotheses

The expectation for corporations to disclose information on carbon emissions has intensified due to a wide range of stakeholders' growing interest in global warming and climate change (Depoers et al., 2014). This expectation has pushed companies to adopt sustainable practices, such as assessing their carbon footprint, reducing emissions, improving energy efficiency, and using renewable energy sources. The increasing need to adhere to regulations and satisfy environmentally conscious stakeholders drives companies to prioritize transparency in their sustainable practices (Rahmaniati & Ekawati, 2024). The growing pressure to improve carbon performance can also influence a company's financial reporting behavior (Houqe et al., 2024). According to Lemma et al. (2020), firms that voluntarily disclose carbon-related data are often perceived as more ethical and focused on building strong stakehold-

er relationships. This dedication to accountability and a strong reputation for environmental stewardship can attract stakeholders, including investors, who demand high ecological and financial reporting standards. As a result, the same corporate ethos that drives a company to be a good environmental citizen also encourages it to be a reliable and trustworthy financial reporter (Litt et al., 2014).

There is a well-established connection between a company's corporate governance, carbon performance, and the quality of its financial reporting. Extensive research consistently shows that effective corporate governance structures improve carbon performance and higher-quality financial reporting (Arora & Dharwadkar, 2011; Martinez-Ferrero et al., 2020; Al-Absy et al., 2024). These studies demonstrate a clear causal link: a company's commitment to strong governance creates a culture of transparency and accountability. This culture drives better environmental performance and ensures that the same degree of rigor and transparency is maintained in financial reporting. Furthermore, from an agency theory perspective, greater transparency reduces information asymmetry between companies and external stakeholders, enhancing external stakeholders' trust (particularly auditors) in reporting data accuracy (Feldman et al., 1997). Decreased information asymmetry can reduce audit risk, potentially leading to shorter ARL and thus delivery of high-quality financial reporting. Similarly, Oh and Jeon (2022) note that delays in delivering audit reports might impair the quality of financial information by not providing timely data to stakeholders. Based on these arguments, our first hypothesis is as follows:

H_1: There is a negative relationship between carbon emission disclosure and ARL.

This research uses agency theory to explore the behavior of family-controlled firms regarding ARL. Agency theory explains the relationship between a principal (e.g., shareholders) and an agent (e.g., management), focusing on potential conflicts of interest. However, in family-controlled companies, a unique type of conflict, a principal-to-principal conflict or Type II agency problem, often occurs. This conflict is between the majority (family) and minority shareholders (Jensen & Meckling, 1976). Studies by Fan and Wong (2002) and Joni et al. (2020) show that family business groups effectively govern a significant portion of Indonesian listed companies. These groups typically hold many shares, with family members often occupying critical positions. This concentrated power allows family owners to expropriate wealth from minority shareholders (Villalonga & Amit, 2006; Salvato & Moores, 2010). They can achieve this by appointing family members to key roles, setting their compensation, and making decisions prioritizing their interests over those of other shareholders (Chen et al., 2008). Related-party transactions benefit the family at the company's expense and are a typical example of this behavior (Shleifer & Vishny, 1986; DeAngelo & DeAngelo, 2000). The presence of family members on the board and in top management can negatively affect corporate governance and firm monitoring (Wang, 2006). This phenomenon leads to greater information asymmetry between the controlling family and other shareholders (Shleifer & Vishny, 1997; Fan & Wong, 2002), reducing the transparency of accounting disclosures (Francis et al., 2005).

When auditors encounter this significant information asymmetry and the potential for self-serving behavior by controlling families, they perceive a higher audit risk. To mitigate this risk, auditors must perform more extensive procedures to verify financial statements, which directly extends the time required to complete the audit report. In addition to family control, many Indonesian companies also have political affiliations (Gomez & Jomo, 1997). Firms with such ties are often viewed as carrying higher risks due to the potential for exploitation by insiders. Research on Malaysian firms, for example, reveals that auditors identified greater risks in politically connected companies, leading them to conduct additional audit procedures and, consequently, delaying the audit report (Gul, 2006). Given these factors, the prevalence of agency problems in family-controlled firms, the heightened risk of expropriation, and the added complexity of political connections, it is plausible that auditors will need more time to complete their work. Therefore, we hypothesize:

H_2: There is a positive relationship between family-controlled firms and ARL.

Based on the arguments and evidence presented, this study predicts that family-controlled firms will weaken the positive relationship between a company's carbon performance and the timeliness of its audit report. The reason is that the unique characteristics of family-controlled firms can alter the dynamics that typically link good corporate governance, environmental performance, and efficient financial reporting.

As discussed in the previous section, family firms often exhibit principal-to-principal conflicts, where the controlling family's interests may not align with those of minority shareholders. These conflicts can lead to information asymmetry and a lack of transparency. From an auditor's perspective, a firm may engage in carbon disclosure to elevate its reputation, but the presence of a controlling family can pose other, more serious agency risks. The auditor may perceive that the primary risk is not the firm's carbon performance but rather the potential for self-serving actions by the family owners. The core idea behind this hypothesis is that the presence of a controlling family moderates the relationship between carbon disclosure and audit report timeliness. In non-family firms, auditors might view a company's strong carbon performance as a positive signal of good corporate governance, which could lead to a more straightforward audit and a shorter audit completion time. However, in a family-controlled firm, this signal might be overshadowed. The auditor's primary concern shifts from assessing the company's commitment to good governance (as evidenced by its carbon performance) to

mitigating the high agency risks associated with family control. Consequently, even if a family-controlled firm discloses its carbon emissions, the auditor's due diligence might not be reduced. The auditor will still need to perform extensive procedures to verify related-party transactions, assess the objectivity of management decisions, and protect minority shareholders' interests. This heightened scrutiny, driven by the inherent risks of family control, would likely negate any benefits in audit timeliness that might otherwise arise from strong carbon performance. Therefore, the study posits the following hypothesis:

H_3: The relationship between the disclosure of carbon emissions and the delay in audit report issuance is less pronounced in family-controlled firms.

3. Methodology

This study employs a matched-pairs design with a balanced panel dataset to investigate the impact of carbon emission disclosure and family ownership on ARL in Indonesia. We first identified family-owned businesses by referencing the article „Family businesses: Maintaining relevance in the modern era" from Globe Asia Business Magazine (GlobeAsia, 2019). We then accessed the websites of these businesses and pinpointed 62 non-financial family firms that had published annual reports for the years 2017 to 2019. A matched control sample of non-family firms was selected based on three criteria to ensure comparability: fiscal year, industry classification, and a similar total asset value. An independent-samples t-test (not shown for brevity) confirmed that the mean total assets of the family and non-family groups were not significantly different. This process resulted in a complete matched-pairs sample of 124 non-financial businesses, yielding 372 observations over the three years (Table 1).

The research period, which spans the fiscal years from 2017 to 2019, was intentionally selected to evaluate the firms' financial reporting practices within a stable economic environment, thereby excluding the confounding effects of the COVID-19 pandemic. The first cases of the pandemic were officially confirmed in Indonesia on March 2, 2020. We focus on the audit report lag from 2017 to 2019 because regulatory deadlines for filing audited financial statements changed due to the COVID-19 pandemic. Usually, the Indonesian Financial Services Authority (OJK) and the IDX require the submission of these statements within 90 days of the fiscal year-end. However, in response to the COVID-19 pandemic, this deadline was extended to five months (Astami et al., 2024). By examining the audit report lag during the pre-pandemic years, this study avoids the influence of this regulatory change, which could otherwise introduce a significant variable impacting the analysis of financial reporting timeliness.

Based on Table 1, most of the samples come from the property, real estate & building construction sectors (30,65%). The lowest sample companies operate in three industries: agriculture, infrastructure, utilities & transportation, and miscellaneous industries. The average ARL for Indonesian firms in the sample is 80 days, near the threshold. The IDX authorities mandate the submission of annual audited financial statements within 90 days of the fiscal year. The infrastructure, utilities & transportation sector takes a shorter period of 69 days on average to complete audit reports, while the trade, services & investment industry sector takes the longest of 86 days. Moreover, the shortest audit completion time is 22 days in the basic industry & chemicals sector, while the longest is 205 days in the property, real estate & building construction sectors. Further examination (not included in the table) reveals that 55 firm-year observations (14.78%) in the sample period did not adhere to the regulatory timeframe of 90 days. Most of these are concentrated within the property, real estate, and building construction sectors.

This study uses ARL as a dependent variable. Abernathy et al. (2017), Oh and Jeon (2022), Gontara et al. (2023), and Astami et al. (2024) define ARL as the period between the fiscal year's end and the audit report's issuance date. The analysis incorporates the level of carbon emission disclosure and family ownership as explanatory variables. The study implements a carbon emissions checklist that Choi et al. (2013) developed and assesses an unweighted approach that treats each disclosure item equally. This method is more objective than a weighted index approach

Table 1. Audit report lag (days) by industry classification (source: researchers' calculation)

Industry	2017–2019			Audit Report Lag (days)		
	n	%	Mean	Median	Min	Max
Agriculture	24	6.45	80	83	50	150
Mining	36	9.68	79	82	45	140
Basic industry & chemicals	60	16.13	75	81	22	121
Miscellaneous industry	24	6.45	82	85	51	141
Consumer goods industry	54	14.52	80	80	31	182
Property, real estate & building construction	114	30.65	83	84	43	205
Infrastructure, utilities & transportation	24	6.45	69	78	31	108
Trade, services & investment	36	9.68	86	86	51	181
Total	372	100,00	80	82	22	205

(Cooke, 1993). The indicator variable is assigned a score of 1 if company *j* discloses information based on the checklist items and 0 if not. Family firms are identified by the percentage of equity ownership and the presence of family members in the executive or supervisory positions (Anderson & Reeb, 2003). In line with prior studies, this study controlled for variables that might impact the timeline of audit reports. The regression analysis incorporates corporate governance mechanisms (such as board size, board independence, and audit committee size) to foster efficiency and enhance management accountability in resource utilization. Extensive literature highlights the strong correlation between effective corporate governance and reliable financial reporting (Arora & Dharwadkar, 2011; Martinez-Ferrero et al., 2020). Big4 auditors are incorporated to control the impact of audit quality on financial reporting quality. Rusmin and Evans (2017) and Abdullatif et al. (2025) state that Big4 audit firms have a significantly shorter ARL than non-Big4 firms. Afify (2009) suggests Big4 audit firms are motivated to complete their audit work quickly to protect their reputation. Firm size, leverage, and profitability are included to control for the effect of a firm's visibility, risk, and financial performance (Al-Tuwaijri et al., 2004; Clarkson et al., 2011; Martinez-Ferrero et al., 2020; Pucheta-Martinez & Gallego-Alvarez, 2020).

Multiple regression of the ordinary least squares is the primary statistical method for testing hypotheses. Model 1 investigates the effect of carbon emission disclosure and family ownership on ARL. Model 2 shows the interaction between carbon emission performance and audit firms on ARL.

$$\textit{Model 1: } ARL_i = a_i + \alpha_{i1}CED_{it} + \alpha_{i2}FAM_{it} + \alpha_{i3}BOC_{it} + \alpha_{i4}BOCINDP_{it} + \alpha_{i5}AC_{it} + \alpha_{i6}BIG_{it} + \alpha_{i7}SIZE_{it} + \alpha_{i8}LEVe_{it} + \alpha_{i9}ROA_{it} + INDUSTRY\ FIXED\ EFFECT_{it} + YEAR\ FIXED\ EFFECT_{it}\ \varepsilon_i ;$$

$$\textit{Model 2: } ARL_i = a_i + \alpha_{i1}CED_{it} + \alpha_{i2}FAM_{it} + \alpha_{i3}CED_{it} \times FAM_{it} + \alpha_{i4}BOC_{it} + \alpha_{i5}BOCINDP_{it} + \alpha_{i6}AC_{it} + \alpha_{i7}BIG_{it} + \alpha_{i8}SIZE_{it} + \alpha_{i9}LEVe_{it} + \alpha_{i10}ROA_{it} + INDUSTRY\ FIXED\ EFFECT_{it} + YEAR\ FIXED\ EFFECT_{it}\ \varepsilon_i .$$

Note: *ARL* = the days between the end of the fiscal year and the date when the audit report is issued. *CED* = Carbon emission disclosure index. The indicator variable scored 1 if the company discloses information as determined in the checklist items and 0 otherwise. *FAM* = takes a value of 1 if the company is classified as a family-controlled firm and 0 otherwise. *BOC* = the total number of members on the board of commissioners as reported by the company. *BOCIND* = the proportion of independent commissioners on the board. *AC* = the total number of members of the audit committee. *BIG4* = take a value of 1 if the company auditor is a Big4 audit firm and 0 otherwise. *SIZE* = the natural log of total assets. LEV = total debt to total assets ratio. ROA = net income to total assets ratio. *YEAR FIXED EFFECT, INDUSTRY FIXED EFFECT* = Fixed effects are included for different years and industries.

4. Findings and discussions

Tables 2 and 3 display the descriptive statistics data and initial indications of relationships among the main variables. Panel A of Table 2 details continuous variables, whereas Panel B focuses on the dummy regression variables. Panel 2 shows that the carbon emission disclosure score varies between 5.56% and 88.89%, with a mean of 35.19%. Table 2 Panel A also presents the range of supervisory board sizes, which varies from two to eleven members, with an average of five. The board's composition includes 41.21% independent commissioners, surpassing the minimum requirement of 33.33% set by the Financial Services Authority Regulation (POJK) No. 33 Year 2014. The audit committee typically consists of three members on average, which aligns with the requirements stated in POJK No. 55 of 2015. The sample firms exhibit a financial profile with a mean total assets of IDR19,838,596 million. However, the median value and skewness indicate a small number of substantially capitalized companies in the sample firms. In line with the approach used in previous research, this study converts the total assets data into a natural logarithm to assess the firm's size. Furthermore, the average total debt-to-assets ratio for the sample firms stands at 46.47%, with a median value of 48.11%. The low average return on assets (4.84%) indicates that companies faced financial difficulties throughout the observed year periods. In addition, Panel B highlights that roughly 44% of the sample observations are audited by Big 4 account-

Table 2. Descriptive statistics (source: researchers' calculation)

Panel A – Continuous Variables					
Variable	Mean	Median	Std Dev	Min	Max
CED	35.19	33.33	15.92	5.56	88.89
BOC	4.92	5.00	1.84	2.00	11.00
BOCIND	41.21	40.00	11.08	20.00	100.00
AC	3.15	3.00	0.49	2.00	5.00
SIZE (Total Assets in million IDR)	19,838,596	7,302,514	36,810,261	21,663	351,958,000
LEV	46.47	48.11	19.46	4.15	97.26
ROA	4.84	3.76	8.17	–40.14	50.67
Panel B – Categorical Variables					
Variable				n	%
BIG4				164	44.09
NON-BIG4				208	55.91
FAM				186	50
NON FAM				186	50

ing firms, indicating a significant alignment with the audit market for listed companies.

In this study, the Spearman correlation matrix assesses multicollinearity among the variables (Table 3). The correlation results support the study's hypotheses. As predicted, a significant negative correlation exists between carbon emission disclosure and ARL, while the latter positively correlates with family ownership. Both correlations are statistically significant at $p < 0.01$. The data presented in Table 3 reveal that all variables' correlation coefficients are below the critical threshold of 0.80. These results imply no indication of multicollinearity among the variables in the regression models (Cooper & Schindler, 2003).

The results of multiple regression analysis for testing H_1 and H_2 are shown in Table 4. Panels A and B demonstrate the regression results for a single independent variable, while Panel C presents the outcomes for each independent variable. The regression model estimates reported in Panels A through C demonstrate statistical significance, with an F-statistic p-value of less than 0.01. Furthermore, the highest reported VIF is 1.791, which assures us that multicollinearity is not a concern. Panels A and C report that the coefficients on CED are negative and statistically significant at $p < 0.005$ and $p < 0.01$, respectively, related to ARL. The negative and statistically significant coefficients for CED support our hypothesis (H_1). Our findings confirm and extend previous research by demonstrating that enhanced corporate environmental disclosure is associated with a shorter ARL. This outcome supports the idea that strong corporate governance and a focus on environmental performance improve the quality of financial reporting. Thus, the results align with similar studies, such as those by Arora and Dharwadkar (2011), Martinez-Ferrero et al. (2020), and Al-Absy et al. (2024). Several factors may drive these results. First, firms dedicated to environmental performance are often committed to broader accountability (Lemma et al., 2020; Rahmaniati & Ekawati, 2024). This commitment frequently leads to better

Table 3. Spearman correlation matrix (source: researchers' calculation)

	ARL	CED	FAM	BOC	BOCIND	AC	BIG4	SIZE	LEV
CED	–0.281*								
FAM	0.171*	0.126**							
BOC	–0.256*	0.392*	–0.001						
BOCIND	–0.007	–0.053	0.071	–0.018					
AC	–0.088	0.250*	–0.179*	0.264*	–0.139*				
BIG4	–0.113**	0.296*	0.087	0.343*	–0.064	0.234*			
SIZE	–0.215*	0.489*	0.027	0.510*	–0.031	0.334*	0.342*		
LEV	–0.051	0.199*	–0.090	0.099	–0,012	0.160*	–0.026	0.310*	
ROA	–0.284*	0.238*	0.173*	0.175*	0.083	0.079	0.207*	0.123*	–0.234*

Note: * $p < 0.01$; ** $p < 0.05$.

Table 4. Individual effects of CED and FAM on ARL (source: researchers' calculation)

Variables	Panel A		Panel B		Panel C		
	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat	VIF
(Constant)		14.984*		15.632*		15.183*	
CED	–0.003	–2.065**			–0.003	–.2.496*	1.689
FAM			0.132	4.488*	0.135	4.947*	1.091
BOC	–0.030	–3.342*	–0.032	–3.718*	–0.029	–3.368*	1.501
BOCIND	0.003	–0.218	0.003	–0.262	0.002	0.177	1.097
AC	–0.007	–0.221	0.019	0.637	0.026	0.860	1.307
BIG4	0.010	0.300	–0.006	–0.189	–0.004	–0.115	1.379
SIZE	–0.010	–0.820	–0.017	–1.562	0.012	–1.102	1.791
LEV	–0.030	–0.389	–0.013	–0.174	–0.001	0.018	1.253
ROA	–1.103	–4.749*	–1.264	–5.576*	–1.218	–5.388*	1.325
YEAR FE	YES		YES		YES		
INDUSTRY FE	YES		YES		YES		
Summary							
Adjusted R^2	0.222		0.261		0.271		
F-statistic	7.232*		8.693*		8.643*		
Observations	372		372		372		

Note: * $p < 0.01$; ** $p < 0.05$.

internal control systems, which help streamline the audit process. Second, these firms are motivated by a strong desire to protect their reputation and maintain stakeholder trust (Feldman et al., 1997). This incentive drives them to provide accurate and timely financial information (Litt et al., 2014; Oh & Jeon, 2022). Ultimately, our study contributes to the growing body of literature by providing specific evidence that a company's environmental commitment is a matter of corporate social responsibility and a practical indicator of its financial reporting quality.

Panels B and C exhibit a positive and significant (with a significance level of $p < 0.01$) association between FAM and ARL, which supports our second hypothesis (H_2). This finding suggests that family-owned firms tend to have a longer ARL. Our finding aligns with existing literature that attributes longer audit times in family firms to several factors. Gomez and Jomo (1997) and Gul (2006) note that family firms often require more resources and effort from external auditors due to their specific ownership and management structures. This phenomenon is primarily because family owners, frequently deeply involved in ownership and management, may influence business decisions more. This deep involvement can create higher information asymmetry than non-family firms, as family interests might be prioritized over those of other shareholders (Shleifer & Vishny, 1997; Fan & Wong, 2002). Family firms have unique risks, such as potential conflicts of interest between family members and other shareholders (Wang, 2006). The higher information asymmetry and distinctive risks in family firms increase the complexity and risk of the audit. Auditors respond by dedicating more time and resources, which leads to a longer ARL.

Concerning control variables, it has been discovered in this study that BOC and ROA play a role in clarifying the timeliness of audit reports. Coefficients on BOC and ROA are negative and significant at $p < 0.01$ across all models. The study finds that more supervisory board members lead to faster completion of audit reports, indicating that a larger board enhances monitoring of financial reporting and reduces audit delays (Lee & Mande, 2005). The study also provides evidence supporting the link between a company's financial performance and risk level. As a company's financial condition improves, its risk exposure decreases. Therefore, profitable firms usually have shorter ARLs (Habib & Bhuiyan, 2011).

To test Hypothesis 3 (H_3), this study performed an OLS multiple regression using Model 2. The statistical results are presented in Table 5.

Table 5 reveals that the interaction term between corporate environmental disclosure and family ownership (CED*FAM) has a positive and significant relationship with ARL, supporting our third hypothesis (H_3). This finding is particularly notable as it suggests that the presence of family control can actually hinder the positive effect of high environmental performance on audit timeliness. In other words, even when a family-owned firm excels at disclosing its carbon emissions, it may still experience significant delays in issuing its audit report. This outcome highlights a key tension between two crucial firm characteristics. While high environmental disclosure is generally associated with greater transparency and efficiency (leading to a shorter ARL), family ownership introduces unique complexities that can override this benefit.

Table 5. Joint effects of CED and FAM on ARL (source: researchers' calculation)

Variables	Panel A		Panel B		Panel C		
	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat	VIF
(Constant)		15.650*		14.219*			14.959*
CED	–0.006	–3.590*	–0.005	2.875*	–0.006	–3.340*	2.648
FAM	0.054	1.134	0.031	0.595	0.038	0.3760	3.661
CED*FAM	0.004	1.991**	0.006	2.409**	0.005	2.337**	4.913
BOC	–0.030	–3.554*	–0.028	–3.074*	–0.030	–3.414*	1.501
BOCIND	–0.001	0.537	0.001	0.536	–0.001	–0.252	1.098
AC	0.050	1.625	0.041	1.276	0.042	1.372	1.378
BIG4	0.004	0.131	–0.016	–0.500	–0.004	–0.141	1.379
SIZE	–0.011	–1.013	–0.010	–0.844	–0.012	–1.052	1.792
LEV	0.011	0.143	0.003	0.040	–0.017	–0.229	1.263
ROA	–1.038	4.943*	–1.363	–5.803*	–1.216	–5.414*	1.325
YEAR FE	YES		NO		YES		
INDUSTRY FE	NO		YES		YES		
Summary							
Adjusted R^2	0.275		0.204		0.280		
F-statistic	12.706*		6.576*		8.579*		
Observations	372		372		372		

Note: * $p < 0.01$; ** $p < 0.05$.

A primary reason for this finding is the intricate nature of decision-making and potential conflicts of interest within family-owned businesses. As noted by Chen et al. (2008), family owners' deep involvement in both management and ownership can lead to a tunneling effect, where private interests are prioritized over public accountability. This phenomenon can result in financial reporting decisions that require additional scrutiny from auditors, regardless of the firm's environmental performance. Furthermore, Shleifer and Vishny (1997) highlight that family firms, while sometimes more efficient, can also be characterized by a greater degree of information asymmetry and a lack of robust governance mechanisms. These factors compel auditors to dedicate more resources and time to ensure the accuracy of financial statements, essentially nullifying the efficiency gains that might come from a firm's environmental commitment.

Ultimately, our findings demonstrate that the governance structure of a firm, specifically whether it is family-controlled, plays a critical role in moderating the relationship between environmental transparency and audit outcomes. The result suggests that auditors and regulators should consider both a firm's environmental performance and its ownership structure when evaluating audit risk and timeliness. The family factor emerges as a powerful influence that can complicate and prolong the audit process, even in firms that otherwise appear to be transparent and well-managed.

This study conducts several additional tests to assess the reliability of the primary findings. Firstly, the research examines the significance of family members' involvement as a prominent characteristic of family businesses. Consequently, this study investigates the effects of active family participation in the enterprise. The presence of family members in key roles within the organization has conflicting implications. In line with agency theory Type II, it is suggested that family members in top management positions may exploit minority shareholders (Salvato & Moores, 2010), commonly through excessive compensation or biased transactions (DeAngelo & DeAngelo, 2000). On the other hand, having family members in management can align owners' interests with the firm's, leading to improved performance and reputation (Davis et al., 1997; Anderson & Reeb, 2003). This research employs two distinct active family controls to investigate the significance of family executives serving as chief executive officers (FAMCEO) and the impact of family involvement on the supervisory board (FAMBOC). FAMCEO is assigned a value of 1 when the controlling shareholder is a family, and a family member occupies the CEO position, and 0 otherwise. Similarly, FAMBOC is assigned a value of 1 when the controlling shareholder is a family, one or more family members hold a board of commissioner position, and 0 otherwise. The additional test results are summarized in Table 6.

Panels A and C show that family members on the board of commissioners (FAMBOC) have a positive and significant (at $p < 0.01$) relationship with ARL. This finding suggests that the presence of family members in supervisory roles is linked to a higher audit timeliness and thus lower financial reporting quality. One potential reason could be that family-run businesses in our study's sample encounter financial difficulties. Additional examination (not

Table 6. Family members' involvement and ARL (source: researchers' calculation)

Variables	Panel A		Panel B		Panel C		
	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat	VIF
(Constant)		14.959*		15.166*		14.850*	
CED	–0.004	–2.674*	–0.003	–2.141**	–0.004	–2.672*	1.703
FAM	0.090	2.851*	0.129	4.169*	0.093	2.820*	1.631
FAMBOC	0.043	2.817*			0.045	2.801*	1.816
FAMCEO			–0.017	–0.440	–0.014	–0.358	1.485
BOC	–0.033	–3.763*	–0.029	–3.318*	–0.033	–3.774*	1.555
BOCIND	0.001	0.466	0.001	0.205	0.001	0.451	1.111
AC	0.043	1.404	0.027	0.880	0.043	1.404	1.360
BIG4	–0.018	–0.589	–0.004	–0.125	–0.019	–0.597	1.420
SIZE	–0.011	–0.954	–0.013	–1.128	–0.010	–0.918	1.811
LEV	0.008	0.101	–0.003	0.100	0.009	0.120	1.258
ROA	–1.223	–5.564*	–1.229	–5.399*	–1.214	–5.385*	1.340
YEAR FE	YES		NO		YES		
INDUSTRY FE	NO		YES		YES		
Summary							
Adjusted R^2	0.285		0.269		0.283		
F-statistic	8.766*		8.179*		8.314*		
Observations	372		372		372		

Note: * $p < 0.01$; ** $p < 0.05$.

presented in the table) validates that the economic performance of family firms is significantly lower than that of non-family firms. Weaker financial standing companies are more likely to have higher audit risk; thus, auditors must look into matters more thoroughly, potentially leading to longer audit reporting timeliness (Habib & Bhuiyan, 2011). Interestingly, our results for family members in executive roles (FAMCEO) differ in Panels B and C. This finding indicates that having a family member as CEO does not have a measurable impact on audit report timeliness. This lack of significance suggests that the influence of family ownership on audit delays primarily stems from their presence in supervisory board positions, where their decisions may have a greater impact on financial oversight and firm risk.

Secondly, the study conducts additional analysis to validate the reliability of the different assessments in audit report delay when considering the classification of sample firms operating in high-profile industries (Table 7). In line with research conducted by Roberts (1992) and Hackston and Milne (1996), this study classifies the sample into low-profile and high-profile industries. High-profile industries are easily noticeable by consumers, have a significant public presence, and are more sensitive to external factors. Furthermore, these industries face substantial political risk and intense competition (Roberts, 1992). Newton and Ashton (1989) and Wan-Hussin and Bamahros (2013) suggest that auditing for companies operating in high-profile industries requires additional audit effort and specialized audit procedures due to their higher inherent risk. Consequently, for these firms, the duration of audit work might be extended. Thus, the high-profile firms are a binary variable equal to 1 if classified as a high-profile industry (mining, basic industry and chemicals, and miscellaneous industries) and 0 otherwise.

The findings from the regression analysis indicate that the specific industry sector influences the time delay in producing audit reports. Panel B of Table 7 reveals that the impact of CED and FAM on ARL remains consistent for companies operating in high-profile industries. More specifically, the CED (FAM) exhibits statistically significant negative (positive) associations, with p-values of 0.10 and 0.01, respectively. This finding contradicts previous research, which suggested that ARL would be longer for auditing firms in high-profile industries.

In addition, this research examines endogeneity and employs the lagged dependent variable approach. This approach helps confirm that the previous year's ARL does not significantly impact the increase or decrease in the ARL (Baatwah et al., 2024). Consequently, we introduce the lagged ARL values as an additional variable in the initial equations. The results of a lagged dependent variable approach are presented in Table 8.

The results from Table 8 are particularly important as they demonstrate that the coefficients for CED and FAM hold up under additional testing, remaining consistent with our primary findings in Table 4. This replication of our core findings across a different model is significant. It confirms the validity and reliability of our original analysis and provides a more robust and trustworthy understanding of the key factors influencing the ARL.

5. Conclusions

This study examines the individual and joint effects of carbon emission disclosure and family-controlled firms on audit report lag. Results show a significant negative association between carbon emission disclosure and audit report lag, suggesting that better carbon emission performance

Table 7. Industry sensitivity (source: researchers' calculation)

Variables	Panel A – Low Profile			Panel B – High Profile		
	Coef.	*t*-stat	VIF	Coef.	*t*-stat	VIF
(Constant)		13.997*			5.269*	
CED	–0.003	–1.426	1.994	–0.004	–.1.757***	1.249
FAM	0.113	3.413*	1.101	0.233	3.793*	1.759
BOC	–0.031	–2.861*	1.464	–0.028	–1.724***	1.723
BOCIND	0.009	0.069	1.098	0.002	0.674	1.290
AC	–0.020	–0.574	1.283	0.169	2.669*	1.705
BIG4	–0.030	–0.795	1.291	–0.001	–0.033	1.617
SIZE	–0.012	–0.943	1.610	–0.004	–0.160	2.372
LEV	0.015	0.169	1.277	–0.162	0.919	1.908
ROA	–1.271	–4.628*	1.433	–1.583	–3.430*	1.538
YEAR FE	YES			YES		
INDUSTRY FE	YES			YES		
Summary						
Adjusted R^2	0.308			0.207		
F-statistic	8.439*			3.389*		
Observations	252			120		

Note: * p < 0.01; ** p < 0.05; *** p < 0.10.

Table 8. Endogeneity test (source: researchers' calculation)

Variables	Panel A		Panel B		Panel C		
	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat	VIF
(Constant)		13.031*		13.506*		13.058*	
CED	–0.004	–2.307**			–0.004	–.2.566*	1.689
FAM			0.118	3.714*	0.122	3.881*	1.091
BOC	–0.025	–2.396**	–0.028	–2.744*	–0.024	–2.377**	1.501
BOCIND	0.001	0.679	0.001	0.742	0.001	0.654	1.097
AC	0.019	–0.542	0.040	1.149	0.048	1.389	1.307
BIG4	–0.064	–1.763***	–0.079	–2.187**	–0.076	–2.123**	1.379
SIZE	–0.010	–0.743	–0.019	–1.445	–0.012	–0.958	1.791
LEV	–0.009	–0.106	0.001	0.104	0.019	0.220	1.253
ROA	–1.354	–5.127*	–1.515	–5.794*	–1.458	–5.600*	1.325
YEAR FE	YES		YES		YES		
INDUSTRY FE	YES		YES		YES		
Summary							
Adjusted R^2	0.237		0.254		0.266		
F-statistic	7.760*		8.434*		8.457*		
Observations	372		372		372		

Note: * p < 0.01; ** p < 0.05; *** p < 0.10.

leads to quicker audit report finalization. The study's findings support the first hypothesis (H_1), highlighting a strong link between corporate environmental performance and financial reporting quality. Moreover, the study reveals a positive and significant association between family firms and audit report lag. This outcome indicates that family-owned firms are more likely to experience longer audit report timeliness, providing evidence for H_2. External auditors see family businesses as having higher risks than non-family businesses. Therefore, audit firms must assign more resources and effort, resulting in extended audit report timeliness. In addition, this research indicates that the joint effect of carbon emission disclosure and family ownership has a strong positive association with the timeliness of audit report issuance, confirming hypothesis H_3. The study highlights that family-owned businesses can mitigate the impact of companies with better carbon performance on audit report deadlines.

The study performs various supplementary examinations to evaluate the reliability of the main findings. Firstly, it reveals that having family members in supervisory roles is linked to a rise in audit report lag and, consequently, a decrease in the quality of financial reporting. Secondly, the regression analysis results suggest that the time taken to produce audit reports is affected by the industry in which a company operates. The effects of carbon performance and family firms on audit report lag are consistently significant for firms within high-profile sectors, contradicting previous research suggesting longer delays for auditing firms in high-profile industries. Finally, this study performs a more robust analysis to check the potential effect of endogeneity and finds that the coefficients for carbon emission disclosure and family firms align with the primary results, thus increasing the credibility and understanding of the factors influencing the audit report lag.

The findings of this research have significant theoretical and practical implications. From a theoretical perspective, this study integrates and extends several key frameworks. By examining the relationship between corporate environmental disclosure (specifically, carbon emissions), family ownership, and audit report timeliness, the research contributes to agency theory by exploring how different ownership structures and environmental transparency practices influence the efficiency of the auditing process. It also enhances stakeholder theory by demonstrating how a firm's commitment to environmental accountability (a key stakeholder concern) can directly impact its financial reporting quality and efficiency. The study provides a more nuanced understanding of the factors that influence audit report lag, moving beyond traditional financial metrics to include non-financial and governance-related variables. From a practical standpoint, the implications are twofold. First, the findings offer valuable insights for firms themselves. The study suggests that companies that voluntarily disclose their carbon emissions may experience a more streamlined and efficient audit process, potentially leading to timelier audit report issuance. This result provides a compelling business case for environmental transparency, indicating that it is not just a matter of corporate social responsibility but also a practice that can improve operational efficiency within the financial reporting function. Second, the research offers actionable intelligence for auditors and regulators. For auditors, understanding the unique dynamics of family-owned enterprises, such as a greater focus on family interests or a more centralized decision-making structure, is crucial. Auditors can use this

knowledge to tailor their audit strategies and resource allocation, helping these firms meet their reporting deadlines. For regulators and standard-setting bodies, the findings underscore the importance of developing clear guidelines and incentives for firms to disclose their environmental performance, recognizing that such transparency can positively impact the overall integrity and timeliness of financial reporting.

This study is subject to several limitations. First, the carbon emission data were collected from the annual reports of publicly listed firms from 2017 to 2019. We recommend that future research utilize sustainability or corporate social responsibility reports, which are expected to provide a more comprehensive account of firms' carbon emission disclosures. Second, given the various forms of family ownership, such as family-run businesses and those managed by external professionals, future research could explore these nuances to understand their impact on financial reporting quality. Finally, our analysis is based on data collected before the COVID-19 pandemic. Future studies could investigate the period encompassing COVID-19 (e.g., 2020–2022) to determine if the results diverge from our findings.

References

Abdullatif, M., Alzebdieh, R., & Ballour, S. (2025). The effect of key audit matters on the audit report lag: Evidence from Jordan. *Journal of Financial Reporting and Accounting*, *23*(1), 257–284. https://doi.org/10.1108/JFRA-07-2022-0245

Abernathy, J. L., Barnes, M., Stefaniak, C., & Weisbarth, A. (2017). An international perspective on audit report lag: A synthesis of the literature and opportunities for future research. *International Journal of Auditing*, *21*(1), 100–127. https://doi.org/10.1111/ijau.12083

Afify, H. A. E. (2009). Determinants of audit report lag: Does implementing corporate governance have any impact? Empirical evidence from Egypt. *Journal of Applied Accounting Research*, *10*(1), 56–86. https://doi.org/10.1108/09675420910963397

Al-Absy, M. S. M., Al-Dhamari, R., Al-Wesabi, H. A. H., & Albitar, K. (2024). Are country-level political uncertainty and power distance important to the CSR-audit report lag nexus? Evidence from the GCC region. *Journal of Sustainable Finance & Investment*, *14*(3), 483–515. https://doi.org/10.1080/20430795.2024.2306511

Al-Tuwaijri, S. A., Christensen, T. E., & Hughes, K. E. (2004). The relations among environmental disclosure, environmental performance, and economic performance: A simultaneous equation approach *Accounting, Organizations, and Society*, *29*(5), 447–471. https://doi.org/10.1016/S0361-3682(03)00032-1

Alfredson, K., Leo, K., Picker, R., Loftus, J., Clark, K., Wise, V., & Dyki, M. (2009). *Applying international financial reporting standards* (2nd ed.). John Wiley & Sons Australia Ltd. https://doi.org/10.2308/jiar.2010.9.2.70

Alkhatib, K., & Marji, Q. (2012). Audit reports timeliness: Empirical evidence from Jordan. *Social and Behavioral Sciences*, *62*, 1342–1349. https://doi.org/10.1016/j.sbspro.2012.09.229

Anderson, R. C., & Reeb, D. M. (2003). Founding family ownership and firm performance: Evidence from the S&P 500. *The Journal of Finance*, *58*(3), 1301–1328. https://doi.org/10.1111/1540-6261.00567

Arora, P., & Dharwadkar, R. (2011). Corporate governance and corporate social responsibility (CSR): The moderating roles of attainment discrepancy and organization slack. *Corporate Governance*, *19*(2), 136–152. https://doi.org/10.1111/j.1467-8683.2010.00843.x

Astami, E., Pramono, A. J., Rusmin, R., Cahaya, F. R., & Soobaroyen, T. (2024). Do family ownership and supervisory board characteristics influence audit report lag? A view from a two-tier board context. *Journal of International Accounting, Auditing and Taxation*, *56*, Article 100638. https://doi.org/10.1016/j.intaccaudtax.2024.100638

Baatwah, S., Almoataz, E., Omer, W., & Aljaaidi, K. (2024). Does KAM disclosure make a difference in emerging markets? An investigation into audit fees and report lag. *International Journal of Emerging Markets*, *19*(3), 798–821. https://doi.org/10.1108/IJOEM-10-2021-1606

Brînzea, V. M., Olimpia, O., & Marinela, B. (2014). The corporate social responsibility: An important aspect for consumers. *Scientific Bulletin-Economic Sciences*, *13*(1), 48–54.

Bubolz, M. (2001). Family as a source, user and builder of social capital *Journal of Socio-Economics*, *30*(4), 129–131. https://doi.org/10.1016/S1053-5357(00)00091-3

Cascino, S., Pugliese, A., Mussolino, D., & Sansone, C. (2010). The influence of family ownership on the quality of accounting information. *Family Business Review*, *23*(3), 193–215. https://doi.org/10.1177/0894486510374302

Chaney, P. K., Faccio, M., & Parsley, D. (2011). The quality of accounting information in politically connected firms. *Journal of Accounting and Economics*, *51*(1–2), 58–76. https://doi.org/10.1016/j.jacceco.2010.07.003

Chariri, A., Nasir, M., Januarti, I., & Daljono, D. (2019). Determinants and consequences of environmental investment: An empirical study of Indonesian firms. *Journal of Asia Business Studies*, *13*(3), 433–449. https://doi.org/10.1108/JABS-05-2017-0061

Chen, S. X., Chen, X., & Cheng, Q. (2008). Do family firms mprovide more or less voluntary disclosure? *Journal of Accounting Research*, *46*(3), 499–533. https://doi.org/10.1111/j.1475-679X.2008.00288.x

Choi, B. B., Lee, D., & Praros, J. (2013). An analysis of Australian company carbon emission disclosures. *Pacific Accounting Review*, *25*(1), 58–79. https://doi.org/10.1108/01140581311318968

Claessens, S., Fan, J. P. H., & Lang, L. H. P. (2006). The benefits and costs of group affiliation: Evidence from East Asia. *Emerging Markets Review*, *7*(1), 1–26. https://doi.org/10.1016/j.ememar.2005.08.001

Clarkson, P. M., Li, Y., Richardson, G. D., & Vasvari, F. P. (2011). Does it really pay to be green? Determinants and consequences of proactive environmental strategies. *Journal of Accounting and Public Policy*, *30*(2), 122–144. https://doi.org/10.1016/j.jaccpubpol.2010.09.013

Cooke, T. E. (1993). Disclosure in Japanese corporate annual reports. *Journal of Business Finance & Accounting*, *20*(4), 521–535. https://doi.org/10.1111/j.1468-5957.1993.tb00272.x

Cooper, D. R., & Schindler, P. S. (2003). *Business research methods* (8th ed.). McGraw-Hill, Irwin.

Davis, J. H., Schoorman, F. D., & Donaldson, L. (1997). Toward a stewardship theory of management. *Academy of Management Review*, *22*(1), 20–47. https://doi.org/10.2307/259223

DeAngelo, H., & DeAngelo, L. (2000). Controlling stockholders and the disciplinary role of corporate payout policy: A study of the times mirror company. *Journal of Financial Economics*, *56*(2), 153–207. https://doi.org/10.1016/S0304-405X(00)00039-8

Depoers, F., Jeanjean, T., & Jerôme, T. (2014). Voluntary disclosure of greenhouse gas emissions: Contrasting the carbon disclosure project and corporate reports. *Journal of Business Ethics*, *134*(3), 445–461. https://doi.org/10.1007/s10551-014-2432-0

Durand, G. (2019). The determinants of audit report lag: A meta-analysis. *Managerial Auditing Journal*, *34*(1), 44–75. https://doi.org/10.1108/MAJ-06-2017-1572

Fan, J. P. H., & Wong, T. J. (2002). Corporate ownership structure and the informativeness of accounting earnings in East Asia. *Journal of Accounting and Economics*, *33*(3), 401–425. https://doi.org/10.1016/S0165-4101(02)00047-2

Feldman, S. J., Soyka, P. A., & Ameer, P. G. (1997). Does improving a firm's environmental management system and environmental performance result in a higher stock price? *The Journal of Investing*, *6*(4), 87–97. https://doi.org/10.3905/joi.1997.87

Francis, J., Shipper, K., & Vincent, L. (2005). Earnings and dividend informativeness when cash flow rights are separated from voting rights. *Journal of Accounting and Economics*, *39*(2), 329–360. https://doi.org/10.1016/j.jacceco.2005.01.001

Garcia, J., Charl, D. V., & Lina, L. (2020). Is a client's corporate social responsibility performance a source of audit complexity? *International Journal of Auditing*, *25*(1), 75–102. https://doi.org/10.1111/ijau.12207

GlobeAsia. (2019). *Family businesses*: *Maintaining relevance in the modern era*. BeritaSatu Media Holdings, Jakarta.

Gomez, E. T., & Jomo, K. S. (1997). *Malaysia's political economy*: *Politics*, *patronage*, *and profits* (1st ed.). Cambridge University Press.

Gontara, H., Khelil, I., & Khlif, H. (2023). The association between internal control quality and audit report lag in the French setting: The moderating effect of family directors. *Journal of Family Business Management*, *13*(2), 261–271. https://doi.org/10.1108/JFBM-11-2021-0139

Gul, F. A. (2006). Auditors' response to political connections and cronyism in Malaysia. *Journal of Accounting Research*, *44*(5), 931–963. https://doi.org/10.1111/j.1475-679X.2006.00220.x

Habib, A., & Bhuiyan, M. B. U. (2011). Audit firm industry specialization and the audit report lag. *Journal of International Accounting*, *Auditing* & *Taxation*, *20*(1), 32–44. https://doi.org/10.1016/j.intaccaudtax.2010.12.004

Habib, A., Bhuiyan, M. B. U., Huang, H. J., & Miah, M. S. (2019). Determinants of audit report lag: A meta-analysis. *International Journal of Auditing*, *23*(1), 20–44. https://doi.org/10.1111/ijau.12136

Hackston, D., & Milne, M. J. (1996). Some determinants of social and environmental disclosures in New Zealand companies. *Accounting*, *Auditing* & *Accountability Journal*, *9*(1), 77–108. https://doi.org/10.1108/09513579610109987

Houqe, M. N., Opare, S., & Zahir-Ul-Hassan, M. K. (2024). Carbon emissions, female CEOs and earnings management. *International Journal of Accounting* & *Information Management*, *32*(4), 593–621. https://doi.org/10.1108/IJAIM-11-2023-0296

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics*, *3*(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Joni, J., Ahmed, K., & Hamilton, J. (2020). Politically connected boards, family business groups, and firm performance: Evidence from Indonesia. *Journal of Accounting* & *Organizational Change*, *16*(1), 93–121. https://doi.org/10.1108/JAOC-09-2019-0091

Lamptey, E. K., Park, J. D., & Bonaparte, I. (2023). Does corporate social responsibility affect the timeliness of audited financial information? Evidence from "100 best corporate citizens. *Journal of Risk and Financial Management*, *16*(2), Article 60. https://doi.org/10.3390/jrfm16020060

Lee, H. Y., & Mande, V. (2005). The relationship of audit committee characteristics with endogenously determined audit and non-audit fees. *Quarterly Journal of Business and Economics*, *44*(3/4), 93–112.

Lemma, T. T., Shabestari, M. A., Freedman, M., & Mlilo, M. (2020). Corporate carbon risk exposure, voluntary disclosure, and financial reporting quality. *Business Strategy and the Environment*, *29*(5), 2130–2143. https://doi.org/10.1002/bse.2499

Litt, B., Sharma, D., & Sharma, V. (2014). Environmental initiatives and earnings management. *Managerial Auditing Journal*, *29*(1), 76–106. https://doi.org/10.1108/MAJ-05-2013-0867

Martinez-Ferrero, J., Lozano, M. B., & Vivas, M. (2020). The impact of board cultural diversity on a firm's commitment toward the sustainability issues of emerging countries: The mediating effect of a CSR committee. *Corporate Social Responsibility and Environmental Management*, *28*(2), 675–685. https://doi.org/10.1002/csr.2080

Newton, J. D., & Ashton, R. H. (1989). The association between audit technology and audit delay. *AUDITING*: *A Journal of Practice* & *Theory*, *8*, 22–49.

Oh, H., & Jeon, H. (2022). Does corporate sustainable management reduce audit report lag? *Sustainability*, *14*(13), Article 7684. https://doi.org/10.3390/su14137684

PriceWaterhouseCoopers. (2018). *Family business survey 2018*: *Indonesia report*. PWC.

Pucheta-Martinez, M. C., & Gallego-Alvarez, I. (2020). Corporate environmental disclosure practices in different national contexts: The influence of cultural dimensions. *Organization* & *Environment*, *33*(4), 597–623. https://doi.org/10.1177/1086026619860263

Rahmaniati, N. P. G., & Ekawati, E. (2024). The role of Indonesian regulators on the effectiveness of ESG implementation in improving firms' non-financial performance. *Cogent Business* & *Management*, *11*(1), 1–30. https://doi.org/10.1080/23311975.2023.2293302

Roberts, R. W. (1992). Determinants of corporate social responsibility disclosure: An application of stakeholder theory. *Accounting*, *Organizations and Society*, *17*(6), 595–612. https://doi.org/10.1016/0361-3682(92)90015-K

Rokhmawati, A. (2020). The nexus between type of energy consumed, CO_2, emissions, and carbon-related costs. *International Journal of Energy*, *Economics and Policy*, *10*(4), 172–183. https://doi.org/10.32479/ijeep.9246

Rusmin, R., & Evans, J. (2017). Audit quality and audit report lag: Case of Indonesian listed companies. *Asian Review of Accounting*, *25*(2), 191–210. https://doi.org/10.1108/ARA-06-2015-0062

Salvato, C., & Moores, K. (2010). Research on accounting in family firms: Past accomplishments and future challenges. *Family Business Review*, *23*(3), 193–215. https://doi.org/10.1177/0894486510375069

Shleifer, A., & Vishny, R. W. (1986). Large shareholders and corporate control. *Journal of Political Economy*, *94*(3), 461–488. https://doi.org/10.1086/261385

Shleifer, A., & Vishny, R. W. (1997). A survey of corporate governance. *The Journal of Finance*, *52*(2), 737–783. https://doi.org/10.1111/j.1540-6261.1997.tb04820.x

Villalonga, B., & Amit, R. (2006). How do family ownership, control, and management affect firm value? *Journal of Financial Economics*, *80*(2), 385–417. https://doi.org/10.1016/j.jfineco.2004.12.005

Wan-Hussin, W. N., & Bamahros, H. M. (2013). Do investment in and the sourcing arrangement of the internal audit function affect audit delay? *Journal of Contemporary Accounting & Economics*, *9*(1), 19–32. https://doi.org/10.1016/j.jcae.2012.08.001

Wang, D. (2006). Founding family ownership and earnings quality. *Journal of Accounting Research*, *44*(3), 619–656. https://doi.org/10.1111/j.1475-679X.2006.00213.x

Wijayati, N., Hermes, N., & Holzhacker, R. (2016). Corporate governance and corruption: A comparative study of Southeast Asia. In R. Holzhacker, R. Wittek, & J. Woltjer, *Decentralization and governance in Indonesia*. *Development and governance* (Vol. 2, pp. 259–292). Springer. https://doi.org/10.1007/978-3-319-22434-3_10