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ENVIRONMENTAL PENALTIES DISCLOSURES AND FINANCIAL PERFORMANCE OF LISTED INDUSTRIAL GOODS FIRMS IN NIGERIA

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Abstract

Despite the efforts of the Nigerian government to promote environmental sustainability through regulations and policies, the level of environmental disclosure of penalties among listed industrial goods firms in Nigeria remains a concern. Based on this, the study examined the effect of environmental penalties disclosures on financial performance of listed industrial goods firms in Nigeria. The study adopted an *ex-post facto* research design and utilized a panel data of ninety (90) pooled observations gathered from nine (9) listed industrial goods firms in Nigeria over ten (10)-year period (2015-2024). The study adopted multiple linear regression to analyze data via E-views 10.0. The data conformed to the standardized regression assumptions, that is, linearity, homoscedasticity, normality and independence of data. The study findings revealed that remediation penalties disclosure has a significant positive effect {Coeff = 0.1957 (0.0368)} on return on asset, reputational penalties disclosure has a significant positive effect {Coeff = 0.1102 (0.0481)} on return on asset, waste penalties disclosure has a significant positive effect {Coeff = 0.1980 (0.0082)} on return on asset, pollution levy disclosure has a non-significant negative effect {Coeff = -0.0944 (0.3545)} on return on asset and lastly, environmental stringency index disclosure has a significant positive effect {Coeff = 0.01291 (0.0071)} on return on asset of listed industrial goods firms in Nigeria. It was concluded that transparency in environmental reporting, particularly with regards to remediation, reputational, and waste penalties, can lead to improved financial performance. The study also recommended that Firms should also prioritize transparency in disclosing reputational penalties, as this can lead to improved financial performance. This can be achieved by including information on reputational risks and penalties in their annual reports and sustainability reports, and by engaging with stakeholders to build trust and credibility.

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1.1 INTRODUCTION

Environmental Penalties Disclosure refers to the practice of publicly reporting fines, sanctions, or penalties imposed on a company for violating environmental laws and regulations. Environmental penalties disclosure and financial performance of listed industrial goods firms is a critical and complex intersection of environmental governance, corporate accountability, and financial sustainability within the context of a developing economy. The increasing awareness of environmental issues and the need for sustainable development have led to a growing interest in the environmental performance of companies. In Nigeria, the environmental challenges are numerous, ranging from oil spills to deforestation, and the role of companies in addressing these challenges cannot be overstated (Emenyi,2024)[2].

Listed industrial goods firms in Nigeria, in particular, have a significant impact on the environment due to the scale and scope of their operations (Nkanga et al., 2023). The Nigerian government has implemented various regulations and policies aimed at promoting environmental sustainability and reducing environmental degradation. For instance, the National Environmental (Envir Samuel, E. N., Emenyi, E O. and Uwah, U. E. (2024).onmental Impact Assessment) Regulations, 1999, require companies to conduct environmental impact assessments and disclose information about their environmental impacts (Haritsar et al., 2022). Similarly, the Nigerian Exchange Market has introduced sustainability disclosure guidelines that encourage listed companies to disclose information about their environmental performance and sustainability practices. Despite these efforts, the level of environmental disclosure among listed industrial goods firms in Nigeria remains a concern, and the impact of environmental penalties on their financial performance is not well understood as posited by Nguyen, (2023).

The financial performance of listed industrial goods firms in Nigeria is influenced by various factors, including environmental penalties as opined by Emenyi and Okpokpo, (2023). Environmental penalties can have a significant impact on a company's financial performance, as they can result in fines, penalties, and reputational damage. Furthermore, environmental penalties can also lead to increased costs, such as the cost of cleaning up contaminated sites or the cost of implementing new environmental management systems. Omaliko et al., (2020) stated that the relationship between environmental penalties disclosure and financial performance of listed industrial goods firms in Nigeria is complex and influenced by various factors. On one hand, environmental penalties disclosure can have a positive impact on a company's financial performance by promoting transparency and accountability. Rania and Dahlan, (2023) recorded that by disclosing information about environmental penalties, companies can demonstrate their commitment to environmental sustainability and reduce the risk of reputational damage. On the other hand, environmental penalties disclosure can also have a negative impact on a company's financial performance by increasing costs and reducing profitability. Therefore, it is essential to investigate the relationship between environmental penalties disclosure and financial performance of listed industrial goods firms in Nigeria to understand the implications of environmental penalties disclosure on financial performance (Ezeagba et al. 2017).

According to Aslam et al. (2021), the nexus between environmental penalties disclosure and financial performance of listed industrial goods firms in Nigeria is essential for various stakeholders, including investors, regulators, and policymakers. Emenyi, (2024)[1] reported that understanding the impact of environmental penalties disclosure on financial performance, investors can make informed decisions about their investments, regulators can develop effective regulations to promote environmental sustainability, and policymakers can

develop policies to support companies in reducing their environmental impacts. Furthermore, the study can also provide insights into the environmental performance of listed industrial goods firms in Nigeria and the effectiveness of environmental regulations in promoting environmental sustainability as supported by Nangih et al. (2022).

1.2 Statement of the problem

The failure of listed industrial goods firms in Nigeria to adequately disclose environmental penalties has created a dangerous precedent of corporate irresponsibility, weakening investor confidence and worsening environmental degradation. While environmental penalties are meant to hold firms accountable for pollution and unsustainable practices, many companies either under report or completely conceal these fines, preventing stakeholders from assessing their true financial and environmental risks (Eneh, 2020). This lack of transparency has allowed corporations to continue operating with impunity, leading to increased industrial waste, air and water pollution, and long-term damage to public health. Instead of enforcing stricter regulations, weak governance structures and corrupt oversight have enabled firms to evade accountability, ultimately causing financial instability in the industrial sector and discouraging foreign investment (Simeon, et. al 2024). With the Nigerian economy already struggling under the weight of poor regulatory enforcement, the concealment of environmental penalties further erodes public trust, limits economic sustainability, and places an unfair burden on communities suffering from environmental hazards. Without immediate reforms in disclosure practices, the financial performance of these firms may deteriorate, leading to wider economic repercussions that could cripple the country's industrial growth.

Unfortunately, despite the efforts of the Nigerian government to promote environmental sustainability through regulations and policies, the level of environmental disclosure of penalties among listed industrial goods firms in Nigeria remains a concern. The problem associated with environmental penalties disclosure and financial performance of listed industrial goods firms in Nigeria revolves around the pressing issues at the intersection of environmental accountability, regulatory compliance, and financial sustainability as explained by (Udomah, & Emenyi,2023). According to Emenyi (2024)[2], the lack of transparency and accountability in environmental disclosure among listed industrial goods firms in Nigeria is a significant problem. Many of these companies do not disclose information about their environmental impacts, including environmental penalties, fines, and sanctions. This lack of disclosure makes it difficult for stakeholders, including investors, regulators, and policymakers, to assess the environmental performance of these companies and the potential risks associated with their environmental impacts (Zhou et al., 2024).

Samuel, et. al., (2024) x-rayed that the problem of environmental penalties disclosure and profitability of listed industrial goods firms is further complicated by the lack of effective regulations and enforcement mechanisms. While the Nigerian government has implemented various regulations and policies aimed at promoting environmental sustainability, the enforcement of these regulations is often weak, which can lead to non-compliance and environmental degradation as propounded by (Lee, 2020). Furthermore, the lack of effective regulations and enforcement mechanisms can also make it difficult for stakeholders to hold companies accountable for their environmental impacts, which can perpetuate the problem of environmental degradation (Hanjani & Kusumadewi, 2023). Therefore, it is essential to investigate the relationship between environmental penalties disclosure and financial performance of listed industrial goods firms in Nigeria to understand the implications of

environmental penalties disclosure on financial performance and to identify strategies for promoting environmental sustainability and reducing environmental degradation.

1.3 Objectives of the study

The main objective of this study was to determine the effect of Environmental penalties disclosures on financial performance of listed industrial goods firms in Nigeria. However, the specific objectives were:

1. To ascertain the effect of remediation penalties disclosures on return on asset of listed industrial goods firms in Nigeria.
2. To evaluate the effect of reputational penalties disclosures on return on asset of listed industrial goods firms in Nigeria.
3. To determine the effect of waste penalties disclosures on return on asset of listed industrial goods firms in Nigeria.
4. To assess the effect of pollution levy disclosures on return on asset of listed industrial goods firms in Nigeria.
5. To examine the effect of environmental stringency index disclosures on return on asset of listed industrial goods firms in Nigeria.

1.4 Research questions

The following questions were formulated:

1. To what extent does remediation penalties affect return on asset of listed industrial goods firms in Nigeria?
2. To what magnitude does reputational penalties affect return on asset of listed industrial goods firms in Nigeria?
3. To what extent does waste penalties disclosure affect return on asset of listed industrial goods firms in Nigeria?
4. To what extent does pollution levy affect return on asset of listed industrial goods firms in Nigeria?
5. To what magnitude does environmental stringency index affect return on asset of listed industrial goods firms in Nigeria?

1.5 Research hypotheses

To answer the questions above, the following hypotheses were formulated and tested;

Ho_1: There is no significant effect between remediation penalties disclosure and return on asset of listed industrial goods firms in Nigeria.

Ho_2: Reputational penalties disclosure has no significant effect with return on asset of listed industrial goods firms in Nigeria.

Ho_3: No significant effect exist between waste penalties disclosure and return on asset of listed industrial goods firms in Nigeria.

Ho_4: No significant effect exist between pollution levy disclosure and return on asset of listed industrial goods firms in Nigeria.

Ho_5: No significant effect exist between environmental stringency index and return on asset of listed industrial goods firms in Nigeria.

1.6 Scope of the study

Content scope: This study examined the effect of environmental penalties disclosure on financial performance of listed industrial goods firms in Nigeria. The independent variable (environmental penalties disclosure) was proxies by remediation penalties disclosure,

reputational penalties disclosure and waste penalties disclosure, pollution levy disclosure and environmental stringency index. However, the dependent variable (financial performance) was proxied by return on asset (ROA).

Geographical scope: This study centred on listed industrial goods firms on the floor of the Nigerian exchange group (NGX) for the period of 10 years, that is from 2015 to 2024.

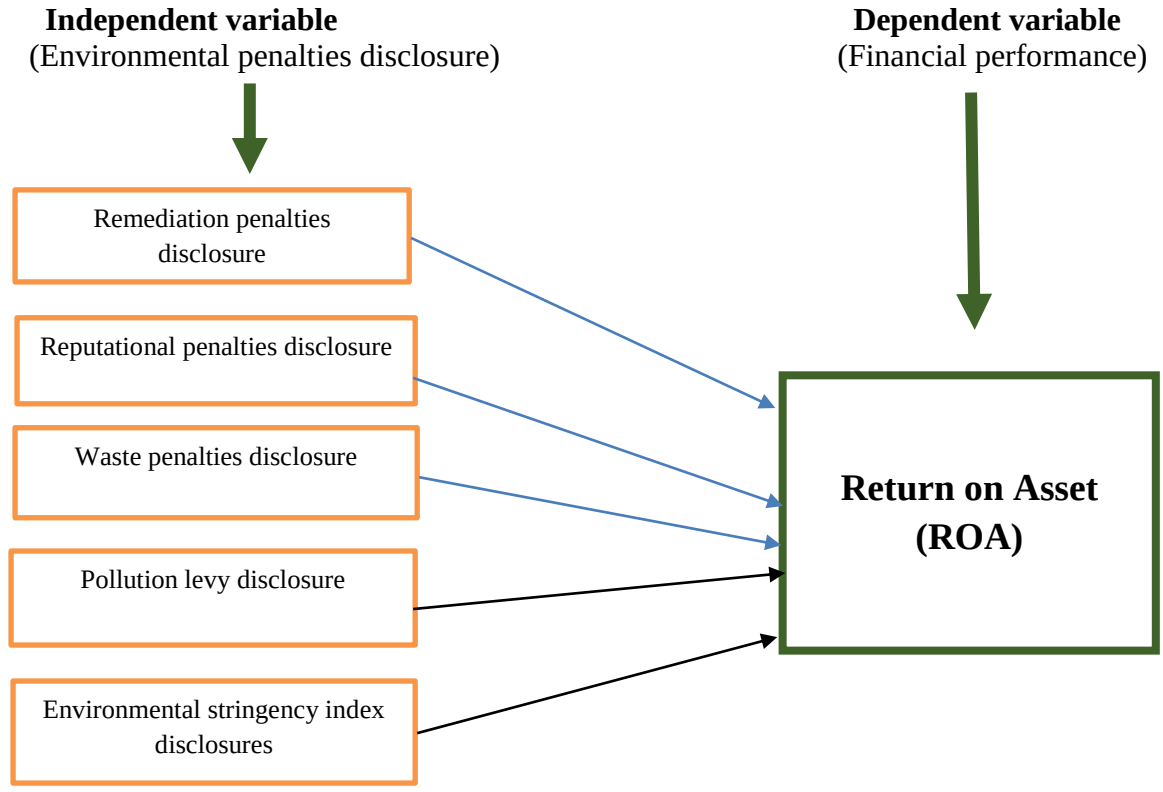
Unit scope: The unit of analysis of this work comprised of thirteen (13) industrial goods firms listed on the floor of the Nigerian exchange group (NGX).

REVIEW OF RELATED LITERATURE

This section reviewed the extant literature related to this study. However, it comprises of conceptual framework, theoretical framework as well as empirical review.

2.1 Conceptual framework

The conceptual framework of variables adopted in the study is as depicted in figure 2.1 below:



2.1: Interrelationships of variables

Source: Researcher's conceptualization, (2025).

2.1.1 Environmental penalties disclosures

Environmental penalties disclosure refers to the practice of companies disclosing information about environmental penalties, fines, and sanctions imposed on them by regulatory authorities. This disclosure is typically made in a company's annual reports, sustainability reports, or other publicly available documents. The purpose of environmental penalties disclosure is to provide stakeholders, including investors, customers, and regulators,

with information about a company's environmental performance and compliance with environmental regulations (Deswanto & Siregar, 2018). This information can be used to assess a company's environmental risk profile, its commitment to environmental sustainability, and its ability to manage environmental risks (Emenyi & Okpokpo, 2023).

Environmental penalties disclosure can take many forms, including the disclosure of specific environmental penalties, fines, and sanctions imposed on a company, as well as the disclosure of more general information about a company's environmental performance and compliance with environmental regulations. For example, a company may disclose information about its environmental policies and procedures, its environmental training programs, and its environmental auditing and monitoring practices as illustrated by (Gunawan & Lina, 2015). However, the Nigerian Exchange Group (NGX) has introduced sustainability disclosure guidelines that encourage listed companies to disclose information about their environmental performance and sustainability practices. Additionally, the National Environmental (Environmental Impact Assessment) Regulations, 1999, require companies to conduct environmental impact assessments and to disclose information about their environmental impacts (Udomah, & Emenyi,2023).

Nguyen (2023), concluded that environmental penalties disclosure is an important aspect of corporate sustainability reporting, as it provides stakeholders with valuable information about a company's environmental performance and risk profile. While there are limitations to environmental penalties disclosure, it can help to promote transparency and accountability in corporate environmental practices and encourage companies to adopt more sustainable environmental practices.

1.2 Remediation penalties disclosure

Remediation penalties disclosure refers to the practice of companies disclosing information about penalties, fines, and sanctions imposed on them by regulatory authorities for environmental remediation-related non-compliance. Environmental remediation refers to the process of cleaning up contaminated sites, such as soil, groundwater, and surface water, to prevent harm to human health and the environment (Rania & Duhlan, 2023). Remediation penalties disclosure is an important aspect of environmental reporting, as it provides stakeholders with information about a company's environmental performance and compliance with environmental regulations. This information can be used to assess a company's environmental risk profile, its commitment to environmental sustainability, and its ability to manage environmental risks as posited by Emenyi (2024)[1] and Emenyi (2024)[2]

Wang et al. (2023) stated that remediation penalties disclosure typically includes information about the type and amount of remediation penalties incurred, the reasons for the penalties, and the steps taken by the company to prevent similar penalties in the future. This information may be disclosed in a company's annual reports, sustainability reports, environmental reports, or other publicly available documents. The disclosure of remediation penalties can provide valuable insights into a company's environmental performance and compliance with environmental regulations. For example, if a company discloses that it has incurred significant remediation penalties due to non-compliance with environmental regulations, this may indicate that the company has a poor environmental track record and may be at risk of incurring additional penalties in the future (Xin et al., 2022).

Remediation penalties disclosure can also be used to assess a company's financial performance and reputation. For example, if a company incurs significant remediation penalties, this may negatively impact its financial performance and reputation. On the other hand, if a company discloses that it has implemented effective environmental management systems and procedures, this may positively impact its financial performance and reputation (Rania & Duhlan, 2023). In Nigeria, the disclosure of remediation penalties is not mandatory

for listed companies. However, the Nigerian Exchange Group (NGX) has introduced sustainability disclosure guidelines that encourage listed companies to disclose information about their environmental performance and sustainability practices (Bao & Yu, 2023). Additionally, the National Environmental (Environmental Impact Assessment) Regulations, (1999) require companies to conduct environmental impact assessments and to disclose information about their environmental impacts (Aslam, et al., 2021). A study by Ding and Shahzad, (2022) revealed that remediation penalties disclosure is an important aspect of environmental reporting, as it provides stakeholders with information about a company's environmental performance and compliance with environmental regulations.

2.1.3 Reputational penalties disclosure

Reputational penalties disclosure refers to the act of publicly acknowledging or disclosing negative events, actions, or consequences that have damaged a company's reputation. This type of disclosure involves openly communicating incidents such as ethical lapses, compliance failures, environmental violations, fraud, or misconduct that have the potential to tarnish a company's brand image, credibility, and trustworthiness in the eyes of stakeholders, including customers, investors, employees, regulators, and the general public (Wu & Xu, 2024). Reputational penalties disclosure plays a crucial role in shaping the financial performance of listed industrial goods firms in Nigeria. When companies openly communicate about reputational penalties resulting from environmental misconduct or non-compliance, it can have profound implications on stakeholder perceptions, brand image, and market value (He et al., 2018). The revelation of such penalties can lead to erosion of trust among investors, customers, and the broader community, ultimately impacting the firm's bottom line as deposited by Emenyi (2024)[2]. Emenyi and Okpokpo, (2023) recorded that by disclosing reputational penalties, firms signal their commitment to ethical practices and accountability, which can help rebuild trust, restore credibility, and safeguard long-term relationships with stakeholders.

Reputational penalties disclosure can drive organizational change and strategic decision-making within listed industrial goods firms in Nigeria. Companies that openly acknowledge reputational penalties and take proactive steps to address them are more likely to invest in sustainable practices, ethical governance, and social responsibility initiatives. Such initiatives not only help mitigate reputational risks but also enhance brand resilience, customer loyalty, and competitiveness in the market (Lee, 2020). Through integrating reputational penalties disclosure into their corporate reporting practices, industrial goods firms can demonstrate their commitment to transparency, integrity, and long-term value creation, thereby fostering a positive reputation that underpins financial performance and sustainable growth (Hanjani & Kusumadewi, 2023).

2.1.4 Waste penalties disclosure

Waste penalties disclosure refers to the practice of companies disclosing information about penalties, fines, and sanctions imposed on them by regulatory authorities for non-compliance with waste management regulations. This disclosure typically includes information about the type and amount of waste penalties incurred, the reasons for the penalties, and the steps taken by the company to prevent similar penalties in the future (Wang et al. 2019). The disclosure of environmental penalties, specifically waste penalties, can have a significant impact on the financial performance of listed industrial goods firms in Nigeria. When companies are transparent about the penalties they incur due to improper waste management practices, it can influence investor perceptions, stakeholder trust, and ultimately financial outcomes (Ma et al.2022).

Moreover, waste penalties disclosure can also drive changes in corporate behavior and encourage improvements in waste management practices. Companies that openly communicate about the penalties they face for environmental violations are more likely to invest in sustainable practices, adopt waste reduction strategies, and enhance their environmental performance overall (Chinedu & Ogochukwu, 2020). Such proactive measures not only mitigate the risk of future penalties but also contribute to long-term cost savings, operational efficiency, and competitiveness. Therefore, waste penalties disclosure serves as a catalyst for promoting environmental stewardship, driving positive organizational change, and ultimately enhancing the financial performance of industrial goods firms in Nigeria (Dzomonda & Fatoki, 2020).

2.1.5 Pollution levy disclosures

Pollution levy disclosures simply mean companies telling the public about the money they pay or might have to pay because of pollution for example, fines, taxes, or fees for breaking environmental rules. When a factory or firm spills waste, emits too much smoke, or breaks other environmental laws, the government may charge it a pollution levy or fine. If the company writes this information in its reports, investors, customers, and communities can see how much the company is being punished and how it is managing the problem. Studies show that when firms are fined or face green taxes, they often respond by sharing more environmental information (Shao et al., 2025; Hu & Xu, 2025). In Nigeria, research also finds that green taxes and other levies can push firms to record and report environmental costs more clearly (Bala et al., 2024). In short: pollution levy disclosures are a way for companies to be honest about the cost and risk of pollution, and this honesty can change how people see and trust them.

Telling the truth about pollution bills matters for the company's money too. If a company is open about fines and environmental costs, investors may judge it more fairly sometimes the company's value falls if the fines are large, but sometimes transparency leads to better long-term trust and even more innovation to reduce pollution (Peng et al., 2023). Research finds that penalties can trigger firms to improve their environmental practices or invest in green technology, though the effect can be short-lived or depend on the company's size and resources (MDPI Sustainability study, 2024; Shao et al., 2025). For a common person: when a listed industrial firm in Nigeria shows its pollution fines clearly, it helps the public and investors see real costs and risks and it can make the firm either pay more in the short run or work harder to pollute less in the long run (Bala et al., 2024).

2.1.6 Environmental stringency index disclosures

Environmental stringency index disclosures are when people or companies talk about how strict the rules are that the government uses to protect the environment, and what those rules mean for business (Lee & Song, 2024). Think of the environmental policy stringency index as a single number that shows how tough a country's environmental laws are (for example, how high pollution taxes are, how strict emission limits are, or how hard it is to get away with breaking rules) (Yu et al., 2024). When companies or reports mention that index, they help readers understand the "rules around them" for example, whether a firm works in a country with light rules (easy) or very strict rules (hard). This matters because stricter rules can push firms to change how they make things, spend money on cleaner machines, or report more about their pollution and actions. Research that builds and uses this index shows it is a trusted way to compare rules across countries and to study how firms react when rules get tougher (Chomachaei & Golmohammadi, 2024; Honma & Hu, 2024; Emenyi, 2024[2]).

When firms put environmental stringency information into their reports, it helps investors, workers, and the public understand future costs and risks. For example, if the index is high where a firm works, investors might worry the company will face higher costs for cleaning up or paying fines or they might see it as a sign the company will invest in cleaner technology and become stronger later on (Honma & Hu, 2024). Studies looking at firm data show mixed results: sometimes stricter rules raise costs and lower short-term profits, and sometimes they encourage innovation that helps firms later on (Song, 2024). So, when companies disclose the stringency index or explain how they are affected by it, readers get a clearer, simpler picture of whether the company faces heavy environmental rules and what that might mean for its money and future plans(Chomachaei & Golmohammadi, 2024; Honma & Hu, 2024; Lee & Song, 2024).

2.1.3 Financial performance

Financial performance is a crucial concept that measures the effectiveness of an organization in utilizing its resources to generate profits and achieve its financial goals. It provides valuable insights into the overall health and sustainability of a business. Analyzing financial performance involves assessing various financial metrics, ratios, and indicators to evaluate how well a company is managing its resources and generating returns for its stakeholders (Ding et al., 2019; Ding et al., 2022). One key aspect of financial performance is profitability, which reflects the ability of a company to generate earnings relative to its expenses and investments. Profitability ratios such as net profit margin, return on assets, and return on equity are commonly used to evaluate how efficiently a company is converting its resources into profits (Li & Yang, (2018). A high level of profitability indicates that the business is effectively managing its costs and generating healthy returns for investors as posited by Kaakeh and Gokmenoglu, (2022). A strong liquidity position is essential for ensuring financial stability and safeguarding against potential cash flow challenges (Pie et al., 2019).

Financial performance also includes evaluating the company's efficiency in managing its assets and liabilities. Asset management ratios such as inventory turnover, accounts receivable turnover, and asset turnover assess how well a company is utilizing its resources to generate revenue. Effective management of assets ensures optimal use of resources and maximizes profitability (Haritsar et al., (2022). Leverage ratios like debt-to-equity ratio and interest coverage ratio reflect the company's use of debt to finance its operations and the ability to meet its debt obligations. Maintaining an appropriate level of leverage is crucial for balancing risk and return and ensuring long-term financial viability (Amahalu, 2020). Dikeh (2020), summarized that the concept of financial performance encompasses various aspects of a company's financial health and operational efficiency. Through evaluating profitability, liquidity, asset management, and leverage, stakeholders can gain a comprehensive understanding of how well a company is performing financially as opined by Ding et al (2022).

2.1.3.1 Return on asset (ROA)

Return on Asset (ROA) is a financial performance metric that measures a company's ability to generate profits from its assets. It is a widely used indicator of a company's efficiency in utilizing its assets to generate earnings as explained by Ma et al., (2022). In the context of environmental penalties disclosure and financial performance of listed industrial goods firms in Nigeria, ROA is a relevant metric to assess the financial performance of listed industrial goods firms in Nigeria. ROA is calculated by dividing a company's net income by its total assets. The resulting ratio represents the percentage return on assets. A higher ROA indicates that a company is generating more profits from its assets,

which is a desirable outcome. Conversely, a lower ROA suggests that a company is not utilizing its assets efficiently, which may be a cause for concern as documented by Romero et al., (2018).

In the phase of environmental penalties disclosure, ROA can be used to assess the impact of environmental penalties on a company's financial performance. For instance, if a company is required to pay environmental penalties, its net income may be negatively affected, leading to a lower ROA. On the other hand, if a company is able to avoid environmental penalties through sustainable practices, its ROA may be positively affected. Furthermore, ROA can be used to compare the financial performance of different companies within the same industry or sector. For example, in the context of listed industrial goods firms in Nigeria, ROA can be used to compare the financial performance of different companies and assess their ability to generate profits from their assets (Zhou et al., 92024). Shevchenko, (2021) posited that return on asset (ROA) can be used to assess the impact of various factors on a company's financial performance. Return on asset (ROA) is a useful metric for assessing the financial performance of companies, including listed industrial goods firms in Nigeria. It provides insights into a company's ability to generate profits from its assets and can be used to compare the financial performance of different companies as posited by Xie et al., (2022).

2.1.4 Environmental penalties disclosure and return on asset on asset (ROA)

The relationship between environmental penalties disclosure and return on assets (ROA) is intricate and multifaceted. When companies disclose environmental penalties incurred due to non-compliance or misconduct, it can have both direct and indirect impacts on their ROA (Zhao et al., 2024; Emenyi, 2024[1]). Directly, the financial implications of environmental penalties, such as fines, remediation costs, or legal fees, can directly reduce a firm's profitability and asset base, thus negatively affecting its ROA. Additionally, the reputational damage resulting from environmental penalties disclosure can lead to decreased consumer trust, investor confidence, and market value, all of which can in turn impact a company's ROA by influencing sales revenues, cost of capital, and overall financial performance as revealed by Deswanto and Siregar, (2018).

Emenyi and Okpokpo (2023) x-rayed that proactive and transparent disclosure of environmental penalties can also lead to positive outcomes for a company's ROA in the long run. The relationship between environmental penalties disclosure and ROA underscores the importance of balancing short-term costs with long-term benefits, transparency with accountability, and environmental stewardship with financial profitability (Emenyi, 2024[1]).

2.1.4.1 Remediation penalties disclosure and return on asset (ROA)

The interrelationships between Remediation penalties disclosure and return on assets (ROA) can be complex and multi-faceted. When a company discloses remediation penalties, it often signifies that the company has faced regulatory or legal issues that have resulted in financial penalties or costs associated with rectifying the situation. These penalties can impact the company's financial performance and, consequently, its return on assets. Firstly, the disclosure of remediation penalties can lead to a decrease in a company's profitability, which, in turn, can affect its return on assets. Remediation penalties typically involve financial costs, such as fines, legal fees, compensation, and expenses related to correcting any wrongdoing (Nangih et al., 2022). These costs can reduce the company's revenues and profitability, thereby lowering its return on assets. Additionally, the negative publicity and reputational damage from remediation penalties can impact customer trust, sales, and market share, further affecting the company's financial performance and ROA as opined by Li and Yang, (2016).

Brady et al. (2019) illustrated that the disclosure of remediation penalties can also signal a commitment to improved governance, risk management, and compliance practices within the company. By implementing measures to prevent future violations, strengthen internal controls, and enhance ethical standards, companies can mitigate the risk of similar incidents occurring in the future. These proactive steps can contribute to a more sustainable and resilient business model, potentially boosting the company's operational efficiency, financial health, and return on assets over time (Brady et al., 2019; Xie et al., 2022; Bao and Yu, 2023). Meanwhile, Ma et al., (2022) concluded that the relationship between remediation penalties disclosure and return on assets underscores the importance of ethical conduct, accountability, and risk management in driving sustainable value creation for companies and their stakeholders.

2.1.4.2 Reputational penalties disclosure and return on asset (ROA)

The relationship between reputational penalties disclosure and return on assets (ROA) is a critical aspect of corporate performance and sustainability. Reputational penalties arise when a company's actions or behavior result in damage to its reputation, often due to ethical lapses, compliance failures, or public controversies. The disclosure of reputational penalties can have significant implications for a company's financial health and its return on assets. When a company discloses reputational penalties, such as negative press coverage, public scrutiny, consumer backlash, or stakeholder criticism, it can impact various aspects of the business that are essential for generating returns on assets. One of the primary ways in which reputational penalties disclosure affects ROA is through its impact on customer trust and loyalty (Ding et al., 2022). A tarnished reputation can erode consumer confidence in the company's products or services, leading to decreased sales, market share, and revenue. As a result, the company's profitability and ROA may suffer due to reputational damage (Romero et al., 2018).

Moreover, the disclosure of reputational penalties can also influence investor perception and confidence in the company. This can affect the cost of capital for the company and potentially impact its return on assets by increasing financing costs or reducing shareholder value. Additionally, reputational damage may deter potential investors or partners from engaging with the company, limiting growth opportunities and hindering the company's ability to maximize its assets effectively (Kaakeh & Gokmenoglu, 2022; Aslam et al., 2021).

Nguyen (2023) concluded that the relationship between reputational penalties disclosure and return on assets highlights the interconnectedness of corporate reputation, financial performance, and stakeholder value. Companies must recognize the significance of managing their reputation as a strategic asset and proactively address any reputational risks to safeguard their ROA and long-term sustainability.

2.1.4.3 Waste penalties disclosure and return on asset (ROA)

The relationship between waste penalties disclosure and return on assets (ROA) is a complex and multidimensional issue that highlights the intersection of environmental responsibility, financial performance, and corporate governance. Waste penalties arise when a company is held accountable for improper waste management practices, environmental violations, or non-compliance with regulations related to waste disposal as exposed by (Ding et al., 2022). The disclosure of waste penalties can have significant implications for a company's financial health and its return on assets. Firstly, waste penalties disclosure can directly impact a company's profitability and operational efficiency. Fines, legal fees, remediation costs, and penalties associated with waste mismanagement can lead to increased

expenses and reduced profitability, ultimately affecting the company's return on assets (Amahalu, 2020).

In addition to the immediate financial repercussions, waste penalties disclosure can also signal deeper underlying issues within the company's risk management practices, compliance culture, and environmental stewardship as stated by Elijodo-Ten et al., (2020). Companies that incur waste penalties may face heightened regulatory scrutiny, operational disruptions, and supply chain risks, which can undermine their ability to effectively utilize their assets and generate sustainable returns (Freeman, 1984). Poor waste management practices not only pose short-term financial risks but also create long-term sustainability challenges that can erode the company's competitive advantage and market positioning. It is imperative for companies to adopt proactive waste management strategies, invest in sustainable practices, and enhance transparency and accountability in waste reporting to mitigate risks, build resilience, and safeguard their financial performance and asset returns in the face of increasing environmental regulations and societal expectations (Emenyi & Okpokpo).

2.1.4.4 Pollution levy disclosures and return on asset

When a company faces a pollution levy (a fine or charge for polluting) and includes that information in its reports, people can better understand how much it costs the company to clean up or follow environmental rules. But this honesty can affect the company’s Return on Assets (ROA) a simple measure that tells us how well a company uses what it owns (like buildings, machines, and money) to make a profit. Telling the truth about pollution fines often means the company takes a financial hit at first, so ROA might go down because more money is spent on fines or cleanup this matches research showing environmental penalties tend to increase reporting and costs (Zhang et al., 2025; Wang et al., 2024).

Over time, though, being open about pollution costs can help a company in a surprising way. If firms are transparent, investors may trust them more, and firms often work harder to reduce pollution by improving processes or using cleaner tech which can lower costs and improve ROA later. Studies show that clear pollution or environmental disclosures can promote innovation and better long-term financial results (Liao & Shi, 2024; Zhang et al., 2025; Wang et al., 2024). To keep it simple: at first, admitting pollution penalties may hurt profits (and ROA), but in the long run, that transparency can lead to better practices and improved returns on assets.

Pollution levy disclosures can influence ROA depending on how management responds after the penalties are made public. If a company treats the disclosure as a wake-up call, it might invest in cleaner technologies, adopt stricter waste management systems, or improve efficiency in production. These changes can reduce future penalties and operating costs, leading to better use of assets and potentially higher ROA over time (Liao & Shi, 2024; Zhang et al., 2025). On the other hand, if a company only pays the fines without changing its behavior, the continuous outflow of money to cover levies can keep lowering ROA year after year. This means the real effect of pollution levy disclosures on ROA depends not just on the size of the penalty, but also on whether the firm takes action to solve the root cause of the problem.

2.1.4.5 Environmental stringency index disclosures and return on asset

Environmental policy stringency disclosures are when a company tells people how tough the environmental rules are where it works and how those rules affect the company.

For example, a firm might say "we work in a country with stricter pollution limits and higher green taxes," or explain how new laws will raise its costs (Honma & Hu, 2024). This kind of information helps everyone investors, workers, and local people understand the risks and likely costs the firm faces. Studies show that using a country-level measure called the environmental policy stringency (EPS) index makes these differences clear and comparable across places, and that firms' efficiency and short-term performance can fall when rules suddenly get much tougher. (Chomachaei & Golmohammadi, 2024; Honma & Hu, 2024).

The link between EPS disclosures and Return on Assets (ROA) a simple measure of how well a company turns its assets into profit often works two ways. At first, stricter rules usually mean higher compliance costs (new equipment, cleaner processes, fines avoided), so ROA can drop in the short term (Lee & Song, 2024). But over time, tougher rules and clear disclosure can push firms to innovate, cut waste, or manage resources better, which can raise ROA later on. Research using many countries' firm data finds exactly this pattern: short-term pain but possible long-term gain, and that clear disclosures about policy stringency also change how risky investors see the firm (which affects investment and price pressures that feed back into ROA). (Chomachaei & Golmohammadi, 2024; Honma & Hu, 2024; Lee & Song, 2024; Yu et al., 2024).

2.2 Theoretical framework

The nexus between environmental penalties disclosure and financial performance of listed industrial goods firms in Nigeria cannot be established without reference to some theoretical underpinnings. Hence, Signaling theory, Legitimacy theory and Stakeholder theory were reviewed but the study however anchored on legitimacy theory with justifiable reasons.

2.2.1 Signalling theory by Spence, (1973)

Signalling theory was initially developed by Spence (1973) and eventually developed by (Connelly et al. 2011). Signalling theory helped explain the behaviour of two parties when they have access to different information; so, it is safe to say that this theory tends to address information asymmetries. In his formulation of signalling theory, Spence (1973) utilized the labour market to model the signalling function of education. The signalling theory has four components; the signaller, signal, receiver and feedback. The fundamental tenet of the signalling theory is that signallers are insiders (such as executives or managers) who possess knowledge about a person, product, or organization that is unavailable to outsiders (e.g., Spence, 1973; Amahalu, 2020). On the whole, insiders get knowledge that outsiders would find beneficial, some of it positive and some of it unfavourable. Examples of this information would be specifics regarding the organization's goods or services, environmental penalties disclosure practices, financial reporting techniques, risks and risk management. This information if passed, is the signal. Insiders obtain both positive and negative private information, and they must decide whether to communicate this information to outsiders. The third component of the signalling timeline is the signal receiver. Receivers are outsiders who don't know much about the organization in question but would wish to learn more, according to signalling models as postulated by (Nkanga et al., 2023).

This theory is the anchor theory for this work and is relevant because it explains that there exists information asymmetry between the firm and the outside stakeholders. In the context of this study, information regarding the impact of the firm's activities on the environment is possessed by the firm or insiders (executives and other relevant staffs). The signalling theory states that the release of this information has implications for both the

signaller (the firm insiders) and the receiver (the outsiders; general public, investors, regulators.); Managerial "information signals" should be beneficial to all participants in the socially responsible firm model (Ezeagba et al., 2017). Here, the feedback is what matters. For signalling to take place, the signaller should benefit by some action from the receiver that the receiver would not otherwise have done (i.e., signalling should have a strategic effect); this usually involves selection of the signaller in favour of some alternatives (in other words, potential investors choosing firms who disclose over those who don't). This means that disclosures of environmental penalties should have influence on the firm's value as documented (Gunawan & Lina 2015).

2.2.2 Stakeholder theory by Edward Freeman, (1984)

Stakeholder theory has become the main theme of many discussions. In a variety of "management science" studies (and even political analyses), it commonly functions as a point of reference in the discourses of agents, in their actions, and in their everyday behaviour. Its present inclination is to emulate environmental disclosure and corporate social responsibility initiatives in order to establish itself as a point of reference, to the point that it has acquired the allures of a dominant discourse. According to Hanjani and Kusumadewi (2023), stakeholders are "all of the agents for whom the firm's development and good health are of prime concern". Freeman (1984) defines them as "any group or individual that can affect or be affected by the realization of a company's objectives. The contrasts between the two approaches are complex. According to stakeholder theorists, while profitability is a crucial goal, other stakeholders' interests are just as essential (Omaliko et al., 2020). Basically, what this means is that in a firm, it's not just about the shareholders and their value maximization which is related to making profits alone; other parties are involved who can equally be seen as stakeholders. Business should be beyond making profits alone. Stakeholder theory is relevant to this work because it explains how different environmental penalties disclosures can affect the various stakeholders of the firm or how the availability of information disclosed can be useful to the stakeholders. The shareholders might not need the information but what about other stakeholders like the community around. What if the community realizes that the company doesn't care or is not socially responsible? What if the customers realize that the firm does not really care about waste management, gas emissions, community development, safety and health of employees, or if they offer standard products? What about the community; who are stakeholders as well, or even potential investors who might need this information to base their judgments. Are they also just going to do business while the environment degrades or the air is polluted and they don't tell the public how they tackle this? These questions come to play in this research.

2.2.3 The Legitimacy theory by Dowling and Pfeffer, (1975)

Dowling and Pfeffer in 1975 propounded the Legitimacy. The legitimacy theory posits that organizations disclose their environmental efforts to gain societal acceptance and legitimacy. In Nigeria, where environmental concerns are increasingly becoming important to various stakeholders, including investors, customers, regulators, and communities, Dowling and Pfeffer, (1975) suggested that industrial goods companies need to demonstrate their commitment to environmental sustainability through transparent disclosure practices. By aligning their environmental disclosures with societal expectations and norms, these firms can enhance their reputation, credibility, and trust among stakeholders, thereby boosting their overall legitimacy in the eyes of investors and the public as seen in Menike, (2020). This enhanced legitimacy can translate into improved financial performance, as investors may view the firm as more sustainable and socially responsible, leading to increased investment

and better returns on investment (Chauhan & Sharma, 2019). Therefore, understanding and applying the legitimacy theory can help industrial goods companies in Nigeria navigate the complex relationship between environmental disclosure practices and return on investment, ultimately contributing to their long-term success and sustainability in the competitive business landscape.

2.3 Empirical review

Peng and Ma (2025) examined non-linear nexus between environmental penalties and enterprise digitalization: Evidence from China. Environmental penalties play an important role in global environmental governance and are a major force driving enterprise environmental compliance. This study explores the impact of environmental penalties on enterprise digitalization based on the challenge-threat theory, involving empirical analysis of $2008-2020$ panel data. The findings indicate an inverted U-shaped nonlinear relationship between environmental penalties and enterprise digitalization. First, the inflection point of environmental penalties is 4.775. When the intensity of environmental penalties is below 4.775, an increase in environmental penalties has a positive effect on enterprise digitalization. Conversely, when the intensity is above 4.775, an increase in environmental penalties has a negative effect on enterprise digitalization. This means that for enterprises with locations with environmental penalties below 4.775, their decision makers can enjoy the positive effects of environmental penalties; for enterprises with locations with environmental penalties above 4.775, their decision makers will need to adopt a hedging mechanism to mitigate the negative effects of environmental penalties. Second, the impact of environmental penalties on enterprise digitalization can be described as a double effect: the facilitating effect lies in the fact that cash flow volatility is detrimental to enterprise digitalization, and environmental penalties reduce enterprise's cash flow volatility, thus facilitating digitalization. The disincentive effect lies in the fact that long-term investment facilitates enterprise digitalization, and environmental penalties reduce long-term investment, thus disincentivizing enterprise digitalization. Third, there is significant heterogeneity in the impact of environmental penalties on enterprise digitalization. In particular, there is a greater inflection point in environmental penalties for enterprises with dual leadership roles and registered in economically developed cities.

Guedhami et al. (2025) do environmental penalties matter to corporate innovation? Environmental penalties play a crucial role in enforcing corporate environmental compliance and performance. In this paper, we examine whether and how government environmental violation penalties influence corporate innovation. Using a large sample of Chinese-listed firms, we find that firms subjected to environmental penalties tend to reduce their investment in R&D, resulting in a reduction in both patent applications and granted patents. These adverse effects intensify with the severity of the penalties and contribute to raising the cost of capital for penalized firms. However, our analysis also reveals that the number of green patent applications tends to increase post-penalty imposition. These results indicate that companies that are subject to environmental penalties may shift their long-term investment strategy from general innovation towards environmental initiatives.

Hu and Xu (2025) examined environmental regulation penalties and corporate environmental information disclosure. Promoting corporate environmental information disclosure has become a critical component in advancing green transformation and achieving high-quality development. This study, based on data from A-share listed enterprises in China from 2009 to 2023, systematically investigates the policy impact of environmental regulation penalties on corporate environmental disclosure practices. The findings reveal that

environmental regulation penalties significantly enhance the level of environmental information disclosure. Moreover, corporate ESG performance plays a positive mediating role between regulatory penalties and disclosure behaviors, suggesting that enterprises respond to regulatory pressure by improving their environmental, social, and governance practices. Green technological innovation also serves as a crucial channel through which environmental penalties influence disclosure, reflecting an increased willingness to disclose driven by innovation-oriented transformation. Heterogeneity analysis further indicates that the effect is more pronounced among firms with low goodwill, enterprises in heavily polluting industries, and those located in regions with high public environmental concern.

Chui et al. (2025) examined the impact of environmental regulation intensity and digital economy on regional environmental penalties. By selecting data related to environmental protection and digital economy in 31 provinces and municipalities in China from 2010 to 2022 as the research sample, this study explores the interplay among environmental regulation intensity, digital economy, and regional environmental penalties. Findings indicate that increasingly stringent environmental regulations decrease regional environmental penalties. Furthermore, the advancement of digital financial inclusion as digital economy's indicator reveals its moderating effect on the relationship between environmental regulations and regional penalties, exhibiting variations across distinct regions. The extent of technological innovation has a similar effect on the relationship between environmental regulations and regional penalties, with notable differences across regions.

Chen et al., (2024), researched on environmental penalties and financing punishment: Evidence from incremental bank loans. This study examines the impact of environmental penalties on corporate incremental bank loans. The results show that both the frequency and degree of environmental penalties significantly reduce corporate incremental bank loans, indicating that corporate environmental penalties lead to “financing punishment” by damaging corporate reputation and increasing risks. This financing punishment can be alleviated by good CSR performance and CSR assurance, indicating that exemplary CSR performance and assurance can provide an “insurance” effect to influence bank loans when a firm has a negative event. We also find that this financing punishment has intra-industry peer effects, suggesting that the environmental penalties incurred by one firm can influence the broader credit decisions of commercial banks within the same industry.

Wu and Xu (2024), examined environmental regulation, agency costs, and financial performance: Based on the release of “The New Environmental Protection Law.” The urgency of protecting our planet cannot be overstated. This paper employs Agency Cost Theory, utilizing "the new EPA" as a case study and the difference-in-difference (DID) model to analyze A-share-listed companies in heavily polluting sectors (2012–2018). The research demonstrates that the implementation of the new EPA leads to a sustained enhancement in the financial performance (UnEBIT) of heavily polluting enterprises. Furthermore, the analysis of the mediating effect from a principal-agent perspective reveals that agency costs play a partially mediating role in the relationship between the new EPA and financial performance. The adoption of the new EPA reduces information asymmetry between shareholders and executives, thereby contributing to the improvement in financial performance. Additionally, when examining the diversity among economic regions and the nature of property rights, it is observed that agency costs have a partially mediating role in the three major economic regions. Notably, heavily polluting state-owned enterprises display heightened sensitivity to the implications of the new EPA, indicating a proactive leadership role. These findings have significant implications for enhancing the financial performance of listed companies operating in heavily polluting industries, as well as for contributing to the

attainment of carbon peaking and carbon neutrality objectives while advancing the development of China's legal framework.

Guedhami (2024), carried out a research on do environmental penalties matter to corporate innovation? Environmental penalties play a crucial role in enforcing corporate environmental compliance and performance. In this paper, we examine whether and how government environmental violation penalties influence corporate innovation. Using a large sample of Chinese-listed firms, we find that firms subjected to environmental penalties tend to reduce their investment in R&D, resulting in a reduction in both patent applications and granted patents. These adverse effects intensify with the severity of the penalties and contribute to raising the cost of capital for penalized firms. However, our analysis also reveals that the number of green patent applications tends to increase post-penalty imposition. These results indicate that companies that are subject to environmental penalties may shift their long-term investment strategy from general innovation towards environmental initiatives.

Chen et al. (2024), assessed environmental penalties and analyst recommendations: Based on the perspective of negative environmental governance performance. This paper aims to test the influence of environmental penalties on analyst recommendations from the perspective of negative environmental governance performance, and further tests the influence of environmental penalties on corporate environmental governance. We subdivide environmental penalties into two dimensions: environmental penalty frequency and environmental penalty intensity based on the breadth and depth of environmental penalties. Then we take listed firms in heavy pollution industries in China from 2015 to 2021 as research samples, and use OLS regression analysis to test the impact of environmental penalty frequency and environmental penalty intensity on analyst recommendations. We find that both environmental penalty frequency and environmental penalty degree are significantly and negatively correlated with analyst recommendations. The heterogeneity analysis finds that the negative impacts of corporate environmental penalties on analyst recommendations are mainly reflected in the group with larger firm size and the group with greater industry competition degree. Further analysis shows that both environmental penalty frequency and environmental penalty degree can promote corporate environmental governance. The results show that environmental penalties bring lower analyst recommendations and reputation loss to enterprises. Under the deterrent effect of environmental penalties and the negative impact of analyst recommendations, enterprises have the motivation to improve environmental governance. This paper finds that corporate negative environmental governance performance is truthfully embedded in analyst recommendation decisions, providing evidence for the mechanism and path for China's environmental governance system to play its role. These findings are conducive to providing new evidence for analysts to play the role of capital market information intermediary. This study expands the literature on the economic consequences of corporate environmental penalties and enriches the literature on the factors affecting analyst recommendations from the new perspective of corporate negative environmental performance.

Zhou et al. (2024), carried out an investigation on environmental administrative penalties and corporate greenwashing. We develop a method that identifies corporate greenwashing adopting a deep learning algorithm and find a robust positive association between environmental administrative penalties and corporate greenwashing. We also find that opportunistic management tendencies and heightened external pressures motivate firms to greenwash after such penalties. Additionally, firms with weak internal control quality, operating within fiercely competitive industries, or located in regions of severe environmental

pollution are more inclined to greenwash to mitigate losses stemming from administrative penalties. Our work provides theoretical insights into the effectiveness of environmental penalties and contributes to the ongoing regulation and disclosure debate.

Li and Ramanathan (2024), examined the interactive effect of environmental penalties and environmental subsidies on corporate environmental innovation: Is more better or worse? Most previous studies fail to investigate the interactive effects of different environmental instruments. Whether adopting more environmental instruments is better or worse for corporate environmental innovation (CEI) remains unclear. In this study, we distinguish between regulatory pressures as punitive pressures (environmental penalties, EP) and incentive pressures (environmental subsidies, ES) and focus on investigating whether EP and ES act as complements or substitutes on CEI. The results reveal that the interactive effect of EP and ES can act as substitutes rather than complements in promoting CEI. The results remain unchanged after a series of robustness tests. Further heterogeneity analysis reveals that the substitutive effect of EP and ES on CEI is more pronounced for state-owned firms and for firms operating in regions characterized by higher environmental quality and greater marketization. Our results provide valuable insights for the government on achieving an optimal outcome by mixing environmental instruments to promote CEI.

Zhao et al. (2024), carried out an investigation on analysis of the moderating effects of environmental regulations on green accounting information disclosure and financial performance of heavily polluting enterprises. This study focuses on the heavy pollution industry of A-share listed companies in China, spanning the period from 2012 to 2022. It meticulously examines the current state of green accounting information disclosure within this sector and delves into the implications of such disclosure on the financial performance of these enterprises. The findings reveal a compelling correlation: the more extensive and transparent the green accounting information disclosed by a company, the more favorable its financial performance tends to be. Furthermore, the study identifies green innovation as a pivotal moderating factor, positively influencing the relationship between disclosure and financial outcomes.

Ntui (2024) examined how corporate governance frameworks influence the relationship between firm internal characteristics and environmental disclosure in Tanzania's extractive industry. Drawing from institutional theory, the research used content analysis and panel data from annual reports from 18 companies, spanning the years 2004 to 2018. The study classified its variables into two primary categories: the first category comprises firm internal characteristics (such as age, size, profitability, kind, structure of ownership, and structure of capital of the organization) that directly impact environmental disclosure. The second group examines corporate governance structures, such as the board's independence, size, gender diversity among board members, and board committees, as factors that reduce or enhance the impacts. The research findings are important because they showed that gender diversity has a moderating effect on the relationship between business size and environmental disclosure. Conversely, the autonomy of the board diminishes the correlation between the company's dimensions, longevity, ownership composition, financial framework, and nature, as well as its disclosure of environmental information.

Ogunmodede et al. (2024) investigated how firm attributes influence sustainability disclosure, focusing on a comparative analysis within the less environmentally sensitive sector in Nigeria. The specific aims included determining the variance in the impact of Leverage on sustainability disclosure and exploring the distinction in the effect of profitability on sustainability disclosure within this sector. Employing a longitudinal and ex-

post facto research design, the study targets a population of 150 listed firms in Nigeria, selecting a sample of 20 firms from both financial and non-financial sectors through judgmental sampling. Data spanning from 2012 to 2021 were gathered from the annual reports and accounts of the chosen firms, along with information from the Nigeria Exchange Group (NGX) fact book. Hypotheses were tested using panel regression and t-test techniques. The primary findings revealed a significant difference in the influence of firm size on sustainability disclosure in more environmentally sensitive industries (P= 0.0002). In summary, the adoption of sustainable development strategies by companies reflects management's acknowledgment of stakeholder perceptions. The study suggested that regulators prioritize environmental and social concerns to encourage sustainable practices, including enhanced disclosure on environmental, social, and governance fronts.

Sari and Adi (2024) examined the impact of firm characteristics on the environmental disclosures of listed oil and gas marketing companies in Nigeria. Specifically, it investigated the significance of leverage and foreign affiliation on environmental disclosures. The study utilized longitudinal data from 10 oil and gas marketing companies listed on the Nigerian Exchange Group over a 10-year period, from 2011 to 2020. Content analysis was employed to extract environmental disclosure data as specified by the Global Reporting Initiative (GRI) 11 of 2021, and panel regression techniques were applied. The findings revealed a significant relationship between leverage, foreign affiliation, and environmental disclosures among the listed oil and gas marketing companies, with p-values of 0.031 and 0.009, respectively. The paper recommended that creditors of these companies should continue to monitor the compliance level of management regarding environmental disclosures.

Bao and Yu (2023) researched on the impact of environmental regulation on corporate financial performance: An empirical study from China. By using dynamic game analysis, a theoretical framework is constructed to investigate the impact of environmental regulations on corporate financial performance. A sample of 3021 A-share listed companies, listed on the Shanghai and Shenzhen stock exchanges from 2010 to 2018, is used for empirical testing with GMM model. Through the matching of regional data and enterprise data, this paper expands the measurement of environmental regulation from meso to micro and then, systematically estimates the impact and mediating effect of environmental regulation on corporate financial performance. The results show that environmental regulation policies and instruments are important factors influencing corporate financial performance and that the main way to improve the efficiency of environmental regulation is to encourage firms to carry out pollution control through technological innovation. The empirical results not only show that environmental regulations can facilitate the upgrading of corporate financial performance, but also that technological innovation, especially green technology innovation, also partially mediates the effect of environmental regulations in promoting corporate financial performance. At the same time, the impact of environmental regulations on corporate financial performance is both constrained and influenced by corporate ownership, industry classification and city level. Environmental regulations are more likely to improve the corporate financial performance of non-state-owned companies than that of state-owned companies. Environmental regulation significantly boosts corporate financial performance in clean industries, but significantly depresses corporate financial performance in polluting industries. Compared with higher-level cities, environmental regulations only facilitate improvements to corporate financial performance in ordinary prefecture-level cities.

Wang et al. (2023), carried out an investigation on can the penalty mechanism of mandatory environmental regulations promote green innovation? Evidence from China's enterprise data. There is no consensus regarding the impact of mandatory environmental

regulations on corporate green innovation. This study explains the divergent conclusions by differentiating between the deterrence mechanism and penalty mechanism of such regulations. Using China's enterprise data from 2010 to 2020, this paper employs the multiple fixed effect panel data model to examine the green innovation behavior of punished enterprises. The findings reveal a significant reduction in both the quantity and quality of corporate green innovation due to environmental penalties. Specifically, the negative impact is observed in the quantity of green innovation associated with end-of-pipe governance and the quality of green innovation related to source control. These results are robust and withstand various robustness tests. Mechanism analysis indicates that environmental penalties do not lead to increased environmental investment or non-green innovations. Heterogeneity analysis demonstrates that adequate financial resources can help companies mitigate the adverse consequences of environmental penalties. This research contributes to understanding the mechanism through which mandatory environmental regulations influence green innovation and offers valuable insights for decision-making towards environmentally friendly economic development.

Nguyen (2023) investigate the relationship between environmental performance and financial performance: Evidence from an emerging East Asian economy. This study investigates the relationship between environmental performance and financial performance in both linear and quadratic functions in an emerging East Asian market. Accounting-based and market-based measures are utilized to capture two different aspects of financial performance. We extend the existing literature by considering a multidimensional aggregate construct of environmental performance and finding empirical evidence of a U-shaped relationship between environmental performance and financial performance. Accordingly, an increase in environmental performance deteriorates financial performance in the beginning, but after its threshold has been reached, the effect reverses and environmental performance ultimately serves profitability and market value. Our findings would be of interest to firms, investors, and policymakers by emphasizing the role of environmental performance in the improvement of financial performance in the long term.

Rania and Dahlan (2023) examined the effect of environmental performance and leverage on financial performance. This study aims to determine the effect of environmental performance and leverage on financial performance. The approach used in this research is quantitative method. This study uses secondary data from annual reports of manufacturing companies listed on the Indonesia Stock Exchange for the 2020-2021 period, amounted to 46 samples. The analysis technique used is multiple linear regression. The result indicates that environmental performance has a positive and significant effect on financial performance and leverage has a negative and significant effect on financial performance. This study's limitations are the short research period from 2020-2021 and only use two variables as the independent variables. The results obtained can be used as an evaluation material for the company and provide insight for investors in making investment decisions. This study can also be used as a reference for further research.

Hanjani and Kusumadewi (2023) ascertained the environmental performance and financial performance: Empirical evidence from Indonesian companies. This study aims to investigate the effect of Audit Committee, firm characteristics, and ISO 14001 on environmental performance. Also, this study analyzes the effect of environmental performance on the financial performance. The data analysis was performed using multiple linear regression Data collection techniques are carried out using annual reports of companies receiving PROPER Award and listed on the Indonesia Stock Exchanges in the year of 2015–2019. The results showed that Audit Committee, firm characteristics, and ISO 14001

significantly influenced environmental performance. Another result is that environmental performance has a positive effect on the financial performance. This study contributes as a reference for the government to make environmental policies so as to encourage the achievement of sustainable development goals (SDGs). This study measures environmental performance using only PROPER which cannot be generalized to all companies listed on the Indonesia Stock Exchanges and other markets. The next studies should use other proxies to measure environmental performance and use other data collection methods such as interviews.

Orajekwe and Ogbodo (2023) investigated the relationship between firm-specific characteristics and environmental disclosure practices of energy firms in sub-Saharan Africa. It examined how profitability, size, and liquidity influence the environmental disclosure index (EDI) of listed energy firms in the region. A quantitative approach was adopted, utilizing secondary data from the annual reports of energy firms listed in Nigeria, South Africa, and Kenya. Regression analysis was employed to assess the impact of firm-specific characteristics on EDI using waste management data based on the Global Reporting Initiative (GRI) 306 guidelines. The findings indicated that Profitability positively affected EDI, indicating greater transparency in reporting environmental initiatives for more profitable firms. Conversely, firm size was negatively correlated with environmental disclosure, suggesting challenges for larger firms in effectively communicating their environmental efforts. However, firm liquidity did not significantly affect EDI.

Enekwe et al. (2023) examined the effect of environmental costs on the financial performance of listed oil and gas companies in Nigeria. The ex-post facto research design was employed for the collection of financial statements of four listed oil and gas companies in Nigeria for a ten-year period from 2010 to 2019. The purposive sampling technique was used for the study. The Panel Ordinary Least Square of the multiple regression model was conducted using the E-views version 9.0 statistical software package. The findings revealed that staff development costs have a negative but insignificant effect on listed Nigerian oil and gas companies' return on assets, while community development costs and employee health and safety costs have a positive but insignificant effect. This implies that the amounts of these costs incurred by the studied companies are too small to have an impact on their performance metrics.

Lawrence and Bernard (2023) carried out research on the moderated regression analysis approach to environmental costs and financial performance of Nigerian industrial goods firms for the period of eleven (11) years from 2011 to 2020, both years inclusive. Environmental costs are independent variables proxied by waste management costs (WMC) and community development costs (CDC) with the moderated variable of firm size (FS), while financial performance is a dependent variable proxied by net profit margin (NPM). The ex-post facto research design and panel data were used for the data collection. The panel estimates of generalized least squares and unit root tests were analyzed using e-views statistical software. The regression result indicates that waste management costs (WMC) and community development costs (CDC) have a significant positive effect on net profit margin (NPM), while the moderated variable of firm size on both waste management costs (WMC) and community development costs (CDC) has a significant negative effect on the net profit margin (NPM) of the selected industrial goods firms in Nigeria.

Ding et al. (2022), carried out an investigation on Environmental administrative penalty, corporate environmental disclosures, and the cost of debt. The role of environmental information disclosure (EID) in debt financing for penalized enterprises remains limited in

the current literature. This research seeks to investigate this topic by focusing on manufacturing firms that have been penalized by the Chinese government for violating environmental rules and regulations. Further, it analyzes how environmental administrative penalties impact the debt cost in the following year. Based on our results, the environmental administrative penalty significantly increases the debt cost in the following year through the negative increment of the company's disclosure quality, and the incremental disclosure plays a mediating role in this relationship. Besides, it has also been found that environmental administrative penalties cannot affect the debt cost by changing the disclosure level. While the existing literature has established that environmental penalties can lead to changes in corporate information disclosure, this research contributes to this literature by revealing that the decline of environmental disclosure quality of penalized firms leads to the increase of financing costs.

Xin et al. (2022), carried out an investigation on do environmental administrative penalties affect audit fees? Results from multiple econometric models. The construction of ecological civilization is an important requirement to realize high-quality development of the economy. Over recent decades, natural disasters, global warming, and other ecological problems have occurred frequently, and countries around the world are facing severe environmental challenges. Sustainable development is an effective way to solve these environmental threats, and environmental administrative penalties play a fundamental role in sustainable growth. So, we explore the response of external stakeholders to environmental administrative penalties from the perspective of auditors. The study examines whether environmental administrative penalties affect audit fees, the heterogeneity effects and the mechanisms. The research uses data of heavily polluting listed firms in China that have been revealed by the Institute of Public and Environmental Affairs (IPE). The findings show the following: (1) environmental administrative penalties can increase audit fees; (2) the effective internal control environment can weaken the positive relationship between firms' environmental administrative penalties and audit fees, and the stronger regional environmental regulation can enhance the positive impact of firms' environmental administrative penalties on audit fees; (3) further analysis shows that the impact of environmental administrative penalties on audit fees mainly comes from the "risk premium mechanism" rather than the "cost compensation mechanism", and the response from audit fees can encourage firms to engage in green innovation activities. The above research conclusions provide a certain reference for auditors' pricing decisions.

Ma et al. (2022), researched on environmental violations, refinancing risk, and the corporate bond cost in China. This paper examines the relationship between environmental violations and the cost of corporate bonds, and further analyzes whether refinancing constraints, the lending restrictions on penalized firms, are an important channel through which environmental violations affect the cost of corporate debt financing in China. Using the manually collected environmental violation events from 2008 to 2020, we find that the bond cost of firms violating environmental regulations increases significantly after being penalized. The finding is robust to potential sample selection bias and endogeneity problems. Furthermore, we find that the effect of environmental violations on the cost of corporate bonds is more profound in short-term debt-dependent firms and can be alleviated by the internal financing dependence. These results confirm that the refinancing risk arising from China's green loan policy on pollution-intensive firms plays a key role in the relation between environmental violations and the cost of capital in the firms. In the context of the growing concerns of global society about climate change, our findings have great implications for pollution-intensive firms, bond investors, and regulatory authorities in emerging economies to manage the increasing environmental risk.

Kaakeh and Gokmenoglu (2022) assessed the environmental performance and financial performance during the COVID-19 outbreak: Insight from Chinese firms. The global pressure to reduce carbon emissions on high-carbon-emitting economies has intensified significantly in recent years. However, these efforts' effect on the firm's financial performance (FP) has been a major concern. This research investigates the relationship between environmental performance (EP) and FP of Chinese firms considering the effect of the COVID-19 outbreak. Data was collected from Refinitiv DataStream and span the period of 2017–2020. In addition to the fixed-effects regression, the novel dynamic panel bootstrap corrected fixed effects and panel corrected standard errors methods were utilized to test the hypotheses. Obtained results revealed two key findings. First, there is weak evidence that higher EP increases firms' FP. Second, the relationship between EP and FP is positive in times of economic distress, meaning that firms must continue investing in environmentally ethical and sustainable projects during the crisis. Our empirical findings extend the existing literature by showing that even in times of crisis, such as COVID-19, an environmentally friendly business model positively affects the firm's financial structure. We discuss the policy recommendations implied by our findings for investors, business owners, managers, and officials in the conclusion section.

Haritsar et al. (2022), empirically postulated on the effect of environmental performance and financial performance on firm value in mining companies listed on the Indonesia Stock Exchange. This study aims to obtain empirical evidence of the Effect of Environmental Performance and Financial Performance on Firm Value, Mining Sector Listed on the Indonesia Stock Exchange. This study uses a quantitative approach with the type of explanatory research. The analytical tool used is Multiple Linear Regression. The results showed that Environmental Performance had an effect on Firm Value. The meaning of this finding is that empirically Environmental Performance is a determining factor for Firm Value in mining companies listed on the Indonesia Stock Exchange. Financial Performance has no effect on Firm Value. The meaning of the research findings is that empirically Financial Performance is not a determining factor for Firm Value in mining companies listed on the Indonesia Stock Exchange.

Xie et al. (2022) examined how environmental performance affects financial performance in the food industry: A global outlook. The impacts of environmental performance on the financial performance of food firms are investigated in this paper using a sample of 6064 food companies from 51 countries. The financial performance is measured through sales and internal funds, and environmental performance is based on whether firms have adopted standards related to environmental management. The empirical results show that, for the full sample, food firms' sales are positively associated with environmental performance, while environmental performance does not impact internal funds. In subsample analyses, this paper finds that the environmental performance of firms in lower-middle-income and upper-middle-income countries has a more significant impact on sales than firms in high-income countries. Moreover, desirable environmental performance significantly increases the internal funds of food firms in most country groups except for high-income countries. Grouping countries by region, we find that environmental performance significantly influences sales in all regions except for Africa. However, for internal funds, it is only substantial in Africa. The results also imply the significance of expanding firm size and adopting foreign technology for food companies to achieve better financial performance.

Shevchenko (2021) carried out an investigation on do financial penalties for environmental violations facilitate improvements in corporate environmental performance? An empirical investigation. Environmental regulations play an essential role in managing

firm behavior and providing a reference point for the minimum standards of corporate environmental performance, yet certain firms fail to ensure their environmental performance meets these standards. This research focuses on public firms that the US government has penalized for violating environmental regulations and investigates whether these firms subsequently improved their environmental performance. Surprisingly, neither the receipt of a penalty for an environmental violation nor the imposition of a greater penalty was associated with improvements in environmental performance. Instead, a penalty for environmental violation predicted further, albeit mild, deterioration in environmental performance. While the existing literature has established that financial penalties deter most firms from committing environmental violations, this research contributes to this literature by revealing that these penalties fail to motivate firms that have violated environmental regulations to improve their environmental performance.

Aslam et al. (2021), researched on environmental management practices and financial performance using data envelopment analysis in Japan: The mediating role of environmental performance. This study investigates the relationship between environmental management practices (EMPs) and financial performance (FP) and consequently ascertains whether environmental performance (EP) can mediate the EMPs–FP nexus. Distinctly using data envelopment analysis and generalised method of moments techniques to analyse a comprehensive dataset of Nikkei 225 listed firms from 2007 to 2018 (1920 firm-year observations), our findings first suggest that EMPs have a positive effect on FP. Second, the desired EP can be achieved through the adoption of comprehensive EMPs. Third, improved EP has a substantial impact on shaping the EMPs' effect on FP. These findings are consistent with the predictions of resource-based view and institutional theories. The results are robust to controlling for different types of alternative measures and endogeneities. The findings have important implications for academics, investors, managers, policymakers and regulators.

Bello and Ogungbenle (2022) scrutinized the determinants of environmental disclosure in Nigeria. Hence the objectives included examining the effect of industry type, leverage and firm size on environmental disclosure. Historical data were obtained from the financial statements and account of firms in the manufacturing and financial sectors listed in the Nigeria Stock Exchange. It was recommended that firms in certain operations that can have effect on the environment should disclose their financial commitments in the annual reports especially those firms that its operations have to do with pollution and other environmental hazard should disclose their environmental information. Adequate number of companies from both manufacturing and non-manufacturing sectors were used for the study with panel data survey of the firms.

Chouaibi et al. (2022) investigated the effect of selected board characteristics on the level of environmental disclosure by European firms. This study used a sample of 220 European companies under the context of a new dataset, namely, DataStream asset database. Corporate environmental disclosure index (CEDI) was developed to measure the level of environmental information. This index was calculated based on the CEDI-related items provided by DataStream. The multiple linear regression analyses were used to verify the effect of the board of directors' characteristics on the level of environmental disclosure. The results indicate that the board size and board independence have a statistically significant and positive impact on the level of environmental disclosure.

Udosen and Enoidem (2022) examined the effect of corporate attributes on environmental disclosure of listed breweries in Nigeria from 2012 to 2021. The independent variable of the study was corporate attributes and was proxied by profitability, leverage and

firm size while the dependent variable of the study was environmental disclosure. Secondary data were used, three hypotheses were formulated and the research design employed in this study was ex post facto research design. To test the hypotheses of the study, the researcher adopted the pooled logistic regression technique and the statistical package employed was STATA 16. The results from the analysis revealed that firm size has a significant effect on environmental disclosures of breweries in Nigeria while profitability and leverage have no significant effect on environmental disclosures of listed breweries in Nigeria during the period under study. Thus, it was concluded that only the size of the firm can significantly determine the likelihood of listed breweries to disclose more of their environmental engagements. It was recommended among others that the management of the Nigerian brewery should expand the total assets base of the companies so that they can be confident of disclosing more environmental information in their financial reports.

METHODOLOGY

This section deliberated on the research design, population of the study, sample size and sampling techniques, sources of data and method of data collection, method of data analysis, model specification as well asmeasurement/operationalization of variables.

3.1 Research design

This work adopted an ex-post facto research design. This design was suitable because the data for the analysis had already transpired, leaving little or no room for the researcher to manipulate it.

3.2 Population of the study

In this study, the population was made up of all industrial companies listed on the floor of the Nigerian Exchange Group (NGX) from 2015 to 2024. As of December 31st, 2024, the total number of industrial companies listed was thirteen (13).

3.2 Sample size determination and sampling procedure

A sample size of nine (9) listed industrial goods firms in Nigeria were arrive at purposively after subjecting it to a validity test using Tabachnick and Fidell (2007) formula. The Tabachnick and Fidell (2007) formula is given as follows;

$n \geq 50 + 8(m)$

Where;

n = number of pooled observation

m = number of predictor variables, i.e 5.

50+8(m) = minimum number of pooled observation

Therefore, $n \geq 50 + 8(3)$

$n \geq 74$

In line with the above, considering three (3) predictor variables for this study, the minimum number of pooled observation for this study stood at 74 while the number of pooled observation with a sample size of nine (9) is 90. (i.e 9 by 10).

3.4 Sampling technique

Purposive sampling technique was use in selecting the required sample. However, availability of data served as the yardstick for selection. The technique enhances the selection of industrial goods firms that were continuously listed by Nigeria stock exchange during the period, that is, (2015-2024) and whose financial statements and reports are available and have been consistently submitted to Nigeria exchange group for the period under study.

3.5 Sources and method of data collection

The data for the dependent and independent variables were extracted from financial reports using contents analysis method and collated with the aid of Microsoft excel software. The panel data methodology was adopted because the study combined time series and cross-sectional data, that is, nine (9) cross-sectional observations for each year and ten-time series for each industrial goods firm regressor and explained variables, a total of ninety (90) pooled observations.

3.6 Method of data analysis

The study adopted multiple linear regression to analyze data via Eviews 10.0. The data conformed to the standardized regression assumptions, that is, linearity, homoscedasticity, normality and independence of data. Durbin Watson statistics is within the range of 2-4. The decision was based on 5% level of significance. Accept null hypothesis (Ho) if probability value (i.e. P-value or Sig.) is greater than or equals to (≥) stated 5% level of significance (α); otherwise, reject and accept alternate hypothesis (H_1), if p-value or sig calculated is less than 5% level of significance (Omaliko et al., 2020).

3.7 Model specification

The model for this study was adopted from the study of Chauhan and Sharma, (2019) but modified to suit the hypotheses of this study. Hence, the author specified the econometric function as;

$ROA = f(RPD, RLPD, WPD, PLD, ESI)$

$ROA_{it} = \beta_0 + \beta_1 RPD_{it} + \beta_2 RLPD_{it} + \beta_3 WPD_{it} + \beta_4 PLD_{it} + \beta_5 ESI_{it} + \mu_{it}$

Where;

ROA_{it} = Return on asset of firm *i* in period *t*

RPD_{it} = Remediation penalties disclosure of firm *i* in period *t*

$RLPD_{it}$ = Reputational penalties disclosure of firm *i* in period *t*

WPD_{it} = Waste penalties disclosure of firm *i* in period *t*

PLD = Pollution Levy disclosures

ESI = Environmental stringency index

β_0 = Intercept or regression constant

$\beta_1, \beta_2 \beta_3 \beta_4 \beta_5$ = Regression coefficients to be estimated for firm *i*in period *t*

μ = Stochastic error term.

3.8 Measurement/operationalization of variables

Table 3.1 below shows the measurement of the variables defined in the model above.

Table 3.2 Operationalization of variables

Concept	Proxy	Measurement	Source
Environmental penalties disclosure ***(Independent variable)***	Remediation penalties disclosure (RPD)	Remediation penalties disclosure index (RPDI) using researcher's compiled checklist.	Brady et al., (2019) Ding et al., (2019).
	Reputational penalties disclosure (RLPD)	Reputational penalties disclosure index (RLPDI) using researcher's compiled checklist.	Elijodo-Ten et al., (2020) Xie et al., (2022).
	Waste penalties disclosure (WPD)	Waste penalties disclosure index (WPDI) using researcher's compiled checklist	Elijodo-Ten et al., (2020) Xie et al., (2022).
	Pollution Levy Disclosure	Pollution levy disclosures index Using researcher's compiled checklist	Elijodo-Ten et al., (2020) Xie et al., (2022).
	Environmental Stringency Index	Environmental stringency index Using researcher's compiled checklist	Elijodo-Ten et al., (2020) Xie et al., (2022).
Financial performance ***(Dependent variable)***	Return on asset (ROA)	Profit after tax (PAT) ÷ Total asset employed (TAE).	Gunawan and Lina, (2015).

Source: Researcher's compilation, (2025).

DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

This section focused on the presentation of data, analysis of the data, testing of the research hypotheses and the discussion of findings based on the results.

4.1 Data presentation

The data for this study is presented in table 4.1 in Appendix I. The data comprise a panel data of ninety (90) pooled observations across nine (9) listed industrial goods firms in Nigeria for ten (10)-year period (2015-2024). The data include the independent variable being environmental penalties disclosure were proxied by remediation penalties disclosure, reputational penalties disclosure and waste penalties disclosure, pollution levy disclosure and environmental stringency index and the dependent variable (financial performance) proxied by return on assets.

4.2 Data analysis

Various statistical techniques were utilized in the analysis of data presented in table 4.1 (see Appendix II). These include descriptive statistics, regression assumption tests and panel multiple regression analysis. The results from the panel multiple regression analysis were used in the testing of the research hypotheses which had been stated in the first section of this work.

4.2.1 Descriptive statistics

This was conducted to understand the behaviour of the data using various statistics including mean, standard deviation, skewness, and kurtosis. The result for the descriptive statistics analysis is as presented in table 4.2 below;

Table 4.2 Descriptive statistics results

	ROA	RPD	RLPD	WPD	PLD	ESL
Mean	8.942056	54.44444	49.81481	60.92593	42.40741	36.48148
Median	8.752247	50.00000	50.00000	66.66667	33.33333	33.33333
Maximum	53.95940	83.33333	83.33333	83.33333	83.33333	66.66667
Minimum	-55.19695	0.000000	16.66667	33.33333	16.66667	16.66667
Std. Dev.	14.38416	17.98182	18.77896	15.23046	15.83331	14.54565
Skewness	-0.183956	-0.599058	0.306213	0.021877	0.464972	0.033651
Kurtosis	7.852372	3.659114	2.330910	2.099576	3.004812	2.014870
Jarque-Bera	88.80327	7.012173	3.085301	3.047542	3.243069	3.656290
Probability	0.000000	0.030014	0.213814	0.217889	0.197595	0.160711
Sum	804.7850	4900.000	4483.333	5483.333	3816.667	3283.333
Sum Sq. Dev.	18414.46	28777.78	31385.80	20645.06	22311.73	18830.25
Observations	90	90	90	90	90	90

Source: Researcher's computation (2025) using E-views 10.0

The results in table 4.2 above indicates that the dependent variable- return on assets and the independent variables which were remediation penalties disclosure, reputational penalties disclosure and waste penalties disclosure, pollution levy disclosure had mean scores of approximately 8.94%, 54.44%, 49.81%, 60.92%, 42.41% and 36.48% respectively. The median values obtained for return on asset, remediation penalties disclosure, reputational penalties disclosure and waste penalties disclosure, pollution levy disclosure were approximately 8.75%, 50%, 50%, 66.67%, 33.33% and 33.33% respectively. These constitute the middle values for the distributions of these variables under the period covered in this study (2015-2024).

In terms of the level of variability and dispersion in the distribution of these variables, the standard deviations obtained for return on asset, remediation penalties disclosure, reputational

penalties disclosure and waste penalties disclosure, pollution levy disclosure were approximately 14.38, 17.98, 18.77, 15.23, 15.83 and 14.54 respectively. This indicates varying levels of variability in the distribution with oil spill cost indicating high variations over the years (2015-2024).

4.2.2 Model evaluation

Residual and coefficient diagnostics were however conducted to assess the suitability of the model as stated in the previous section. These include normality test, multicollinearity test, heteroscedasticity test and autocorrelation assessment.

4.2.2.1 Normality test

The essence of a normality test is to determine if a dataset or sample follows a normal distribution. This is important because many statistical models assume normality, and deviations from normality can affect the validity of statistical inference. The Jarque-Bera test was employed in this case. As applied, if the p-value associated with the Jarque-Bera test is below a predetermined significance level ($p<0.05$), then we reject the null hypothesis and conclude that the data do not follow a normal distribution. With a p-value of 0.096721, there is sufficient evidence to conclude that the data were normally distributed.

4.2.2.2 Multicollinearity test

In examining the association among the variables, the study employed the Spearman Rank Correlation Coefficient (correlation matrix), and the results are as presented in table 4.3 below**.**

Table 4.3 Correlation matrix

	ROA	RPD	RLPD	WPD	PLD	ESL
ROA	1.000000	0.221183	0.006382	-0.086944	-0.013152	0.030106
RPD	0.221183	1.000000	0.337441	0.048924	0.127638	0.142429
RLPD	0.006382	0.337441	1.000000	0.517079	0.109797	0.142956
WPD	-0.086944	0.048924	0.517079	1.000000	0.122825	0.284416
PLD	-0.013152	0.127638	0.109797	0.122825	1.000000	0.056091
ESL	0.030106	0.142429	0.142956	0.284416	0.056091	1.000000

Source: Researcher's computation (2025) using E-views 10.0

Table 4.3 above shows the association between two pairs of the variables of the study. Of particular interest is the relationship existing between each pair of the independent variables. As highlighted, no pair of the independent variables have correlation coefficient greater than 0.80 suggesting the absence of multicollinearity issues in the series.

4.2.2.3 Heteroscedasticity test

Table 4.4 Heteroscedasticity test

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	32.35938	36	0.6425
Pesaran scaled LM	-1.489711		0.1363
Pesaran CD	-1.459794		0.1443

Source: E-views 10.0 Output (2025)

The statistics and probability value associated with the Breusch-Pagan LM test otherwise known as the Breusch-Pagan Godfrey test help determine whether there is evidence of heteroscedasticity in the regression model. A low p-value ($p<0.05$) suggests evidence against the null hypothesis in favour of the alternate hypothesis which indicates the presence of heteroscedasticity in the regression model. With a p-value of 0.6425 ($p>0.05$), there is sufficient evidence to accept the null hypothesis, thus, conclude that the predictor variables in the regression model were homoscedastic.

4.2.2.4 Autocorrelation

Autocorrelation, also known as serial correlation, occurs when there is a correlation between the residual errors of a time series or panel data over time. Autocorrelation tests examine whether the residuals are independently distributed or if there is a systematic pattern of dependence. The Durbin-Watson statistic is commonly used to test for autocorrelation, with values close to 2 indicating no significant autocorrelation. The Durbin-Watson statistic as obtained from the panel regression results (see Appendix II) was utilized in this case. The Durbin-Watson statistic value of 2.0535 suggests that there is no evidence of autocorrelation in the residuals of the model.

4.3 Test of hypotheses

Each of the hypotheses in this study was tested based on the result obtained from the panel multiple regression analysis. The result that relates to these hypotheses is summarized in table 4.5 below;

Table 4.5 Panel multiple regression results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	30.65038	9.389421	3.264352	0.0016
RPD	0.195711	0.092261	2.721289	0.0368
RLPD	0.110231	0.100981	3.091602	0.0481

WPD	0.198046	0.121990	4.623468	0.0082
PLD	-0.094480	0.101485	-0.930972	0.3545
ESL	0.012917	0.110399	3.117008	0.0071

R-squared	0.676394	Mean dependent var	8.942056
Adjusted R-squared	0.621417	S.D. dependent var	14.38416
S.E. of regression	14.22929	Akaike info criterion	8.212823
Sum squared resid	17007.71	Schwarz criterion	8.379477
Log likelihood	-363.5770	Hannan-Quinn criter.	8.280027
F-statistic	11.89566	Durbin-Watson stat	2.053553
Prob(F-statistic)	0.000095		

Source: Researcher's computation (2025) using E-views 10.0

The multiple regression line is as written below:

ROA = 30.6503756719 + 0.195711227422*RPD + 0.110230783246*RLPD+ 0.198046251191*WPD - 0.0944801165707*PLD + 0.0129174859702*ESL + μ

The regression equation reveals that when all variables are held constant, Return on Asset (ROA) stands at 30.65%. Additionally, a 1% increase in Remediation Penalties Disclosure (RPD) leads to a 0.20% increase in ROA, while a 1% increase in Reputational Penalties Disclosure (RLPD) and Waste Penalties Disclosure (WPD) leads to a 0.11% and 0.20% increase in ROA, respectively. Conversely, a 1% increase in Pollution Levy Disclosure (PLD) leads to a 0.09% decrease in ROA. Furthermore, a 1% increase in Environmental Stringency Index (ESI) leads to a 0.01% increase in ROA. These findings suggest that transparency in environmental reporting, particularly with regards to remediation, reputational, and waste penalties, can lead to improved financial performance, while pollution levy disclosure may have a negative effect on financial performance.

4.3.1 Hypothesis one

Ho: Remediation penalties disclosure has no significant effect on return on asset of listed industrial goods firms in Nigeria.

H_1: Remediation penalties disclosure has significant effect on return on asset of listed industrial goods firms in Nigeria.

By way of testing whether the variations in return on assets of listed industrial goods firms on Nigeria caused by remediation penalties disclosure is significant. The T test was carried out at .05 significance level and T_{cal} = 2.7212, compared with T_{tab} of 2.262, given at $T_{0.05,9,}$ So far, the T_{cal} is greater than T_{tab}. Hence, the null hypothesis which states that remediation penalties disclosure has no significant effect on return on asset of listed industrial goods firms in Nigeria fails to hold, thus rejected, and the alternative hypothesis accepted.

The null hypothesis is further rejected given that its probability value (p-value = 0.0368) is less than 0.05 ($p<0.05$).

4.3.2 Hypothesis two

Ho: Reputational penalties disclosure has no significant effect on return on asset of listed industrial goods firms in Nigeria.

H_1: Reputational penalties disclosure has significant effect on return on asset of listed industrial goods firms in Nigeria.

Regarding Reputational penalties disclosure, the T_{cal} of 3.0916 is greater than T_{tab} of 2.262, given at $_{T0.05,9,}$ Hence, the null hypothesis which states that reputational penalties disclosure has no significant effect on return on asset of listed industrial goods firms in Nigeria fails to hold, thus rejected, and the alternative hypothesis accepted. The null hypothesis is further rejected given that its probability value (p-value = 0.0481) is less than

0.05 ($p<0.05$).

4.3.3 Hypothesis three

Ho: Waste penalties disclosure has no significant effect on return on asset of listed industrial goods firms in Nigeria.

H_1: Waste penalties disclosure has significant effect on return on asset of listed industrial goods firms in Nigeria.

Regarding waste penalties disclosure, the T_{cal} of 4.6234 is greater than T_{tab} of 2.262, given at $_{T0.05,9,}$ Hence, the null hypothesis which states that waste penalties disclosure has no significant effect on return on asset of listed industrial goods firms in Nigeria fails to hold, thus rejected, and the alternative hypothesis accepted. The null hypothesis is further rejected given that its probability value (p-value = 0.0082) is less than 0.05 ($p<0.05$).

4.3.4 Hypothesis four

Ho: Pollution levy disclosure has no significant effect on return on asset of listed industrial goods firms in Nigeria.

H_1: Pollution levy disclosure has significant effect on return on asset of listed industrial goods firms in Nigeria.

For pollution levy disclosure, the T_{cal} of 0.9309 is less than T_{tab} of 2.262, given at $_{T0.05,9,}$ Hence, the null hypothesis which states that pollution levy disclosure has no significant effect on return on asset of listed industrial goods firms in Nigeria holds, thus accepted, and the alternative hypothesis rejected. The null hypothesis is further accepted given that its probability value (p-value = 03545) is less than 0.05 ($p<0.05$).

4.3.4 Hypothesis five

Ho: Environmental stringency index has no significant effect on return on asset of listed industrial goods firms in Nigeria.

H_1: Environmental stringency index has significant effect on return on asset of listed industrial goods firms in Nigeria.

Regarding Environmental stringency index, the T_{cal} of 3.1170 is greater than T_{tab} of 2.262, given at $_{T0.05,9,}$ Hence, the null hypothesis which states that environmental stringency index has no significant effect on return on asset of listed industrial goods firms in Nigeria fails to hold, thus rejected, and the alternative hypothesis accepted. The null hypothesis is further rejected given that its probability value (p-value = 0.0071) is less than 0.05 ($p<0.05$).

4.4 Discussion of findings

4.4.1 Remediation penalties disclosure and return on assets

The study's finding that remediation penalties disclosure has a significant positive effect on return on asset (ROA) of listed industrial goods firms in Nigeria implies that a 1% increase in remediation penalties disclosure is associated with a 0.1957% increase in ROA. This suggests that firms that disclose remediation penalties may experience a 19.57% increase in ROA for every 100% increase in remediation penalties disclosure. The finding implies that transparency in environmental reporting, particularly with regards to remediation penalties, can lead to improved financial performance. Firms that prioritize environmental responsibility and transparency may be viewed more favorably by stakeholders, leading to increased financial performance. This is consistent with the studies by Hu and Xu (2025) and Hanjani and Kusumadewi (2023). Hu and Xu (2025) find that environmental regulation penalties significantly enhance the level of environmental information disclosure, which can lead to improved financial performance. Hanjani and Kusumadewi (2023) also find that environmental performance has a positive effect on financial performance. These studies suggest that environmental penalties disclosure can have a positive impact on financial performance, possibly by promoting transparency and accountability.

4.4.2 Reputational penalties disclosure and return on assets

The study's finding that reputational penalties disclosure has a significant positive effect on ROA of listed industrial goods firms in Nigeria implies that a 1% increase in reputational penalties disclosure is associated with a 0.1102% increase in ROA. This suggests that firms that disclose reputational penalties may experience an 11.02% increase in ROA for every 100% increase in reputational penalties disclosure. The finding implies that firms that prioritize transparency and accountability in environmental reporting may be viewed more favorably by stakeholders, leading to improved financial performance. The study by Orajekwe and Ogbodo (2023) found that profitability positively affects environmental disclosure index, indicating greater transparency in reporting environmental initiatives for more profitable firms. This study aligns with the finding that reputational penalties disclosure has a significant positive effect on return on asset. Both studies suggest that environmental disclosure can have a positive impact on financial performance.

4.4.3 Waste penalties disclosure and return on assets

The study's finding that waste penalties disclosure has a significant positive effect on ROA of listed industrial goods firms in Nigeria implies that a 1% increase in waste penalties disclosure is associated with a 0.1980% increase in ROA. This suggests that firms that disclose waste penalties may experience a 19.80% increase in ROA for every 100% increase in waste penalties disclosure. The finding implies that transparency in environmental reporting, particularly with regards to waste management, can lead to improved financial performance. Firms that prioritize environmental responsibility and transparency may be viewed more favorably by stakeholders, leading to increased financial performance. The study by Hu and Xu (2025) finds that environmental regulation penalties significantly

enhance the level of environmental information disclosure. This study aligns with the finding that waste penalties disclosure has a significant positive effect on return on asset. Both studies suggest that environmental penalties disclosure can have a positive impact on financial performance.

4.4.4 Pollution levy disclosure and return on assets

The study's finding that pollution levy disclosure has a non-significant negative effect on ROA of listed industrial goods firms in Nigeria implies that a 1% increase in pollution levy disclosure is associated with a 0.0944% decrease in ROA, although this effect is not statistically significant. This suggests that firms that disclose pollution levies may not experience a significant impact on financial performance. The finding implies that pollution levies may be viewed as a necessary cost of doing business, and that firms may not benefit from disclosing this information. The study by Enekwe et al. (2023) finds that staff development costs have a negative but insignificant effect on listed Nigerian oil and gas companies' return on assets. This study aligns with the finding that pollution levy disclosure has a non-significant negative effect on return on asset. Both studies suggest that certain environmental costs or penalties may not have a significant impact on financial performance.

4.4.5 Environmental stringency index and return on assets

The study's finding that environmental stringency index has a significant positive effect on ROA of listed industrial goods firms in Nigeria implies that a 1% increase in environmental stringency index is associated with a 0.01291% increase in ROA. This suggests that firms that operate in environments with stricter environmental regulations may experience a 1.291% increase in ROA for every 100% increase in environmental stringency index. The finding implies that firms that are able to adapt to stricter environmental regulations may be more likely to be innovative and competitive, leading to improved financial performance. The study by Bao and Yu (2023) finds that environmental regulations can facilitate the upgrading of corporate financial performance. This study aligns with the finding that environmental stringency index has a significant positive effect on return on asset. Both studies suggest that environmental regulations can have a positive impact on financial performance.

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary of findings

This present study examined the effect of environmental penalties disclosure on financial performance of listed industrial goods firms in Nigeria. The independent variable (environmental penalties disclosure) was proxies by remediation penalties disclosure, reputational penalties disclosure and waste penalties disclosure, pollution levy disclosure and environmental stringency index. However, the dependent variable (financial performance) was proxied by return on asset (ROA). This study centered on listed industrial goods firms on the floor of the Nigerian exchange group (NGX) for the period of 10 years, that is from 2015 to 2024. The study relied on a panel least squares regression analysis and the results of empirical findings were as follows.

Remediation penalties disclosure has a significant positive effect {Coeff = 0.1957 (0.0368)} on return on asset of listed industrial goods firms in Nigeria.

Reputational penalties disclosure has a significant positive effect {Coeff = 0.1102 (0.0481)} on asset of listed industrial goods firms in Nigeria.

Waste penalties disclosure has a significant positive effect {Coeff = 0.1980 (0.0082)} on return on asset of listed industrial goods firms in Nigeria.

Pollution levy disclosure has a non-significant negative effect {Coeff = -0.0944 (0.3545)} on return on asset of listed industrial goods firms in Nigeria.

Environmental stringency index has a significant positive effect {Coeff = 0.01291 (0.0071)} on return on asset of listed industrial goods firms in Nigeria.

5.2 Conclusion

This study examined the effect of environmental penalties disclosure on financial performance of listed industrial goods firms in Nigeria. The results suggest that transparency in environmental reporting, particularly with regards to remediation, reputational, and waste penalties, can lead to improved financial performance. This implies that firms that prioritize environmental responsibility and transparency may be viewed more favorably by stakeholders, leading to increased financial performance. The findings of this study have significant implications for firms operating in Nigeria's industrial goods sector, highlighting the importance of environmental responsibility and transparency in achieving financial success. The study's findings also have important implications for policymakers and regulatory bodies. The results suggest that environmental regulations and penalties can have a positive impact on financial performance, particularly when firms prioritize transparency and environmental responsibility.

5.3 Recommendations

Based on the findings of this study, the following recommendations should be adhered to:

Listed industrial goods firms in Nigeria should prioritize transparency in disclosing remediation penalties, as this can lead to improved financial performance. Firms can achieve this by including detailed information on remediation efforts and penalties in their annual reports and sustainability reports.

Firms should also prioritize transparency in disclosing reputational penalties, as this can lead to improved financial performance. This can be achieved by including information on reputational risks and penalties in their annual reports and sustainability reports, and by engaging with stakeholders to build trust and credibility.

Listed industrial goods firms in Nigeria should prioritize transparency in disclosing waste penalties, as this can lead to improved financial performance. Firms can achieve this by implementing effective waste management systems and disclosing information on waste penalties and remediation efforts in their annual reports and sustainability reports.

While pollution levy disclosure was found to have a non-significant negative effect on return on asset, firms should still prioritize reducing pollution and complying with environmental regulations. Firms can achieve this by implementing effective pollution control measures and investing in clean technologies.

Policymakers and regulatory bodies in Nigeria should prioritize environmental stringency, as this can lead to improved financial performance for listed industrial goods firms. This can be achieved by implementing and enforcing effective environmental regulations and policies, and by providing incentives for firms to adopt sustainable business practices.

5.4 Contributions to knowledge

This study contributes to the existing body of knowledge by providing evidence that remediation penalties disclosure, reputational penalties disclosure, and waste penalties disclosure have significant positive effects on return on asset of listed industrial goods firms in Nigeria.

The study highlights the importance of environmental stringency index in improving financial performance, suggesting that firms operating in environments with stringent environmental regulations tend to perform better financially.

The finding that pollution levy disclosure has a non-significant negative effect on return on asset contributes to the ongoing debate on the impact of environmental costs on financial performance, suggesting that pollution levy disclosure may not be a significant factor in determining financial performance.

The study provides industry-specific insights into the relationship between environmental penalties disclosure and financial performance in the industrial goods sector in Nigeria, which can inform decision-making by firms and policymakers.

The study contributes to the empirical evidence on the relationship between environmental disclosure and financial performance, providing valuable insights for firms, policymakers, and stakeholders seeking to promote sustainable business practices.

5.5 Suggestions for further studies

Future studies could explore the impact of environmental disclosure on other financial performance metrics, such as return on equity or Tobin's Q ratio.

Further research could investigate the role of firm characteristics, such as firm size or industry type, in moderating the relationship between environmental disclosure and financial performance.

A comparative study of different industries could provide insights into the industry-specific factors that influence the relationship between environmental disclosure and financial performance.

Future studies could examine the impact of environmental disclosure on non-financial performance metrics, such as customer satisfaction or employee engagement.

Further research could investigate the role of regulatory frameworks in shaping the relationship between environmental disclosure and financial performance, providing insights into the effectiveness of different regulatory approaches.

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APPENDICES

APPENDIX I

ENVIRONMENTAL PENALTIES DISCLOSURES CHECKLIST AND MEASURES USED TO OPERATIONALIZE THE INDEPENDENT VARIABLES

1. REMEDIATION PENALTIES DISCLOSURE (RPD)		
CODE	**ITEMS**	**OPERATIONALIZATION**
RPD1	Has the company disclosed the number and types of remediation penalties incurred during the year?	1 = Disclosed 0 = Not disclosed
RPD2	Has the company disclosed the monetary value of remediation penalties paid?	1 = Disclosed 0 = Not disclosed
RPD3	Has the company disclosed specific remediation actions taken to address environmental penalties?	1 = Disclosed 0 = Not disclosed
RPD4	Does the company have a strategy or policy to prevent future remediation penalties?	1 = Disclosed 0 = Not disclosed
RPD5	Has the company disclosed timelines or progress updates for remediation projects?	1 = Disclosed 0 = Not disclosed
RPD6	Has the company partnered with regulators or other organizations to manage remediation issues?	1 = Disclosed 0 = Not disclosed
2. REPUTATIONAL PENALTIES DISCLOSURE (RLPD)		
CODE	**ITEMS**	**OPERATIONALIZATION**
RLPD1	Has the company disclosed any reputational penalties incurred (e.g., fines or lawsuits)?	1 = Disclosed 0 = Not disclosed
RLPD2	Has the company disclosed actions taken to mitigate reputational risks?	1 = Disclosed 0 = Not disclosed
RLPD3	Has the company outlined specific steps to rebuild	1 = Disclosed

	trust after reputational penalties?	0 = Not disclosed
RLPD4	Does the company report on media or public backlash related to reputational issues?	1 = Disclosed 0 = Not disclosed
RLPD5	Has the company disclosed collaborations with public relations experts or firms?	1 = Disclosed 0 = Not disclosed
RLPD6	Has the company disclosed any awards or recognition for improving its reputation?	1 = Disclosed 0 = Not disclosed
3. WASTE PENALTIES DISCLOSURE (WPD)		
CODE	**ITEMS**	**OPERATIONALIZATION**
WPD1	Has the company disclosed the number and types of waste-related penalties incurred?	1 = Disclosed 0 = Not disclosed
WPD2	Has the company disclosed the monetary value of waste-related penalties paid?	1 = Disclosed 0 = Not disclosed
WPD3	Has the company disclosed actions taken to minimize waste penalties?	1 = Disclosed 0 = Not disclosed
WPD4	Does the company report on its waste generation and disposal practices?	1 = Disclosed 0 = Not disclosed
WPD5	Has the company disclosed any collaborations aimed at improving waste management?	1 = Disclosed 0 = Not disclosed
WPD6	Has the company disclosed targets or benchmarks for reducing waste penalties?	1 = Disclosed 0 = Not disclosed
4.	**POLLUTION LEVY DISCLOSURE (PLD)**	
CODE	**ITEMS**	**OPERATIONALIZATION**
PLD1	Has the company disclosed the number and types of waste-related pollution incurred?	1 = Disclosed 0 = Not disclosed
PLD2	Has the company disclosed the monetary value of waste-related pollution paid?	1 = Disclosed 0 = Not disclosed
PLD3	Has the company disclosed actions taken to minimize pollution?	1 = Disclosed 0 = Not disclosed
PLD4	Does the company report on its pollution levy and disposal practices?	1 = Disclosed 0 = Not disclosed
6.	**ENVIRONMENTAL STINGENCY INDEX (ESI)**	
CODE	**ITEMS**	**OPERATIONALIZATION**
ESI1	Has the company disclosed the number and types of	1 = Disclosed

	waste-related penalties incurred?	0 = Not disclosed
ESI2	Has the company disclosed the monetary value of waste-related penalties paid?	1 = Disclosed 0 = Not disclosed
ESI3	Has the company disclosed actions taken to minimize waste penalties?	1 = Disclosed 0 = Not disclosed
ESI4	Does the company report on its waste generation and disposal practices?	1 = Disclosed 0 = Not disclosed
ESI5	Has the company disclosed any collaborations aimed at improving waste management?	1 = Disclosed 0 = Not disclosed
ESI6	Has the company disclosed targets or benchmarks for reducing waste penalties?	1 = Disclosed 0 = Not disclosed