A COMPARATIVE STUDY ON E-WASTE INFORMATION DISCLOSURE BETWEEN MALAYSIA AND INDONESIA: THE ROLE OF CORPORATE GOVERNANCE MECHANISM

MATCHING GRANT
SO CODE: 21976

HAFIZAH ABD MUTALIB
PURNAMA SYAE PURROHMAN
NOR ATIKAH SHAFAI
IRDALISA
BENNY HENDRIANA

UNIVERSITI UTARA MALAYSIA
UNIVERSITAS PROF. DR. HAMKA
2026

DISCLAIMER

Kami, dengan ini, mengaku bertanggungjawab di atas ketepatan semua pandangan, komen teknikal, laporan fakta, data, gambarajah, ilustrasi dan gambar foto yang telah diutarakan di dalam laporan ini. Kami bertanggungjawab sepenuhnya bahawa bahan yang diserahkan ini telah disemak dari aspek hakcipta dan hak keempunyaan. Universiti Utara Malaysia (UUM) dan Universitas Muhammadiyah Prof. Dr. Hamka (UHAMKA) tidak bertanggungan terhadap ketepatan mana-mana komen, laporan dan maklumat teknikal dan fakta lain dan terhadap tuntutan hakcipta dan juga hak keempunyaan.

We are responsible for the accuracy of all opinion, technical comment, factual report, data, figures, illustrations and photographs in the article. We bear full responsibility for the checking whether material submitted is subject to copyright or ownership rights. UUM does not accept any liability for the accuracy of such comment, report and other technical and factual information and the copyright or ownership rights claims.

Penyelidik UUM:

_____
Tandatangan

HAFIZAH ABD MUTALIB
(Ketua)

_____
Tandatangan

NOR ATIKAH SHAFAI (Ahli)

Penyelidik UHAMKA:

_____
Tandatangan

PURNAMA SYAEPUROHMAN
(Ketua)

_____
Tandatangan

IRDALISA (Ahli)

_____
Tandatangan
BENNY HENDRIANA (Ahli)

ACKNOWLEDGEMENT

بسم الله الرحمن الرحيم

Alhamdulillah, first and foremost, we praise Allah SWT for the guidance, strength and patience granted to us in completing this study.

We would like to express our gratitude to Tunku Puteri Intan Safinaz School of Accountancy, Universiti Utara Malaysia (TISSA-UUM) and Universitas Muhammadiyah Prof. Dr. Hamka (UHAMKA) for funding this study under the Matching Grant (SO Code: 21976).

Special thanks go to the faculty members of TISSA-UUM and UHAMKA for the valuable input they gave throughout this study. We also thank Assoc. Prof. Dr. Muhammad Rosni Amir Hussin and Dr. Ooi Sue Chern for their constructive comments and suggestions at both the development and final stages of the report. Their views have improved this study a great deal.

We are also grateful to the company and the interview respondent who gave their time to share their experience of e-waste management practices.

Finally, our deepest thanks go to our family members for their endless support throughout this study.

ABSTRACT

Electronic waste is one of the fastest growing waste streams in Southeast Asia, yet little is known about how listed companies report it. This study compares e-waste information disclosure in Malaysia and Indonesia and examines how corporate governance mechanisms affect that disclosure. Content analysis was applied to the annual and sustainability reports of Malaysian and Indonesian listed companies for the period 2021 to 2024, producing 416 firm-year observations for Malaysia and 81 for Indonesia. Disclosure was measured by quantity, using a sentence count, and by quality, using a four-point index. Ordinary least squares regression was used to test the effect of board size, board independence, board meeting frequency, board gender diversity, the sustainability steering committee, institutional ownership and managerial ownership on disclosure. The quantitative findings were then explored through an interview with the head of sustainability of a Malaysian listed telecommunications company. The results show that e-waste disclosure is low in both countries, averaging 2.97 sentences in Malaysia and 2.01 sentences in Indonesia. Malaysian firms report mainly on recycling and disposal, while Indonesian firms mention e-waste largely to satisfy sustainability reporting requirements. Board size reduces disclosure in both countries and board independence has no effect in either, while the sustainability steering committee shows a consistent positive effect. Industry type is the strongest predictor in both markets. The interview confirms that regulation and senior management commitment drive practice, while investor pressure on e-waste remains absent. The study extends stakeholder theory to e-waste reporting and supports the case for a specific e-waste reporting requirement in both countries.

Keywords: e-waste, information disclosure, corporate governance, stakeholder theory, Malaysia, Indonesia

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

The digital era has given rise to a new form of environmental threat, namely waste arising from obsolete electrical and electronic devices (Abd-Mutalib et al., 2021). Contemporary daily activity is heavily dependent on such devices. This dependence became more pronounced during the Covid-19 pandemic, when work, learning and communication shifted online. The environmental concern arises once these devices reach the end of their useful life and require disposal. Such devices are termed e-waste, and they cannot be disposed of together with domestic waste. E-waste contains hazardous substances that are harmful to human health and the environment, including lead, mercury, cadmium, aluminium, arsenic and brominated flame retardants (Department of Environment Malaysia, 2023). Prior studies report that individuals exposed to the open burning of e-waste experience coughing and chest pain. More severe outcomes include thyroid hormone disruption, impaired child growth and cancer (Orisakwe et al., 2019; Parvez et al., 2021).

The scale of the problem is well documented. The Global E-waste Monitor 2024 reports that global e-waste generation reached a record 62 million tonnes in 2022, an increase of 82% over 2010, and projects a further rise to 82 million tonnes by 2030 should current trends persist (Baldé et al., 2024). Of the volume generated in 2022, only 22.3% was formally collected and recycled in an environmentally sound manner. The remainder was undocumented, stockpiled, traded informally or handled under unsafe conditions. Asia accounted for approximately 30 million tonnes, close to half of the global total, yet records among the weakest formal collection and recycling rates relative to the volume it generates. The gap between generation and recovery is therefore widening rather than narrowing. This positions e-waste among the most pressing waste management challenges of the digital era.

Within Asia, Southeast Asia has emerged as a region of particular concern, and Malaysia and Indonesia represent two contrasting positions within it. Indonesia, the fourth most populous country in the world, generated approximately 1.9 million tonnes of e-waste in 2022. National data from the Ministry of Environment and Forestry

indicate that only about 17.4% of the volume recorded in 2021 was properly managed (Baldé et al., 2024; Waste4Change, 2022). Malaysia generates a smaller absolute volume, although its per capita figure is comparatively high, and it manages e-waste primarily through the scheduled waste regime administered under environmental legislation (Department of Environment Malaysia, 2023). The two countries also diverge in their treatment of transboundary movement, as Malaysia restricts the importation of e-waste while Indonesia has applied weaker controls. These differences in regulatory posture, institutional capacity and enforcement provide a meaningful basis for comparison.

Attention has increasingly shifted from household behaviour towards corporate accountability, as companies are both major users of electrical and electronic equipment and major generators of e-waste. Regulators in both countries have responded by strengthening non-financial reporting requirements. In Malaysia, Bursa Malaysia's Sustainability Reporting Framework requires listed issuers to report on material environmental matters. In Indonesia, the Financial Services Authority requires listed companies to publish sustainability reports under its sustainable finance regulation (Otoritas Jasa Keuangan, 2017). Corporate reporting has therefore become the principal channel through which stakeholders may observe how firms manage their e-waste. The determinants of the quality and extent of such reporting, however, remain poorly understood, and corporate governance represents the most plausible internal explanation. This study accordingly examines the level and themes of e-waste information disclosure among public-listed companies in Malaysia and Indonesia, together with the governance characteristics that shape it.

1.2 Problem Statement

Despite the considerable harm that e-waste causes to human health and the environment, research on e-waste management and practices among public-listed companies remains limited. These companies face sustained stakeholder pressure to safeguard both society and the environment. Given their resource capacity (Faisal et al., 2025), they are well positioned to lead sustainability initiatives relating to e-waste and to report such initiatives in their annual reports. To date, however, there is insufficient

evidence on the extent of e-waste disclosure by public-listed companies, or on the factors that determine it.

This study investigates e-waste information disclosure by public-listed companies in Malaysia and Indonesia. The Global E-Waste Monitor Report published by the United Nations (Forti et al., 2020) identifies Southeast Asia as among the highest e-waste generating sub-regions in Asia, with Indonesia recording the largest volume. Two explanations are plausible. Public awareness of the hazards associated with e-waste remains limited, and there are no restrictions on the importation of e-waste from developed countries. These conditions also help to explain the illegal e-waste dumping reported in the country (Baldé et al., 2017). Malaysia, by comparison, generates e-waste at a moderate level and regulates it under hazardous waste legislation (Department of Environment Malaysia, 2023), which restricts importation. Bursa Malaysia further expects companies in the technology and telecommunications industries to demonstrate their commitment to e-waste handling in their annual reports. These contrasting regulatory and institutional settings make a comparison of e-waste practices and disclosure between the two countries particularly informative.

Beyond assessing e-waste disclosure in the two countries, this study also examines the contribution of corporate governance to e-waste practices and disclosure. Corporate governance plays a central role in reconciling stakeholder interests, as its principal components, namely the board of directors, shareholders and management, exert considerable influence over a firm's environmental initiatives (Giannarakis et al., 2020). Underpinned by Stakeholder Theory, the study anticipates a positive relationship between corporate governance and improved e-waste practices, which is ultimately reflected in the disclosure published in the corporate annual report.

1.3 Research Questions

Based on the discussion in the problem statement, the study aims to answer the following questions:

1.3.1 How different is the level of e-waste information disclosure in Malaysia and Indonesia?

1.3.2 How different are the themes of e-waste information disclosure in Malaysia and Indonesia?

1.3.3 Do corporate governance mechanisms affect e-waste information disclosure in both countries?

1.3.4 How do corporate governance mechanisms affect e-waste information disclosure in both countries?

1.3.5 What other factors contribute to e-waste practices and disclosure in both countries?

1.4 Research Objectives

This study intends to achieve the following objectives:

1.4.1 To compare the level of e-waste information disclosure in Malaysia and Indonesia.

1.4.2 To compare the themes of e-waste information disclosure in Malaysia and Indonesia.

1.4.3 To examine the effect of corporate governance on e-waste information disclosure in both countries.

1.4.4 To explain how corporate governance mechanisms affect e-waste information disclosure in both countries.

1.4.5 To understand other factors of e-waste practices and disclosure in both countries.

1.5 Significance of Study

This study is significant on two fronts. First, it addresses a documented gap in the accounting and sustainability reporting literature, in which e-waste has rarely been isolated as a reporting item despite its growing environmental and health consequences. Second, it adopts a comparative design across two Southeast Asian economies with

markedly different regulatory regimes. The contributions are set out below in practical and theoretical terms.

1.5.1 Practical Significance

For regulators and standard setters, the findings provide evidence on whether the existing reporting frameworks in Malaysia and Indonesia yield meaningful e-waste disclosure, or whether such disclosure remains largely narrative and promotional. Bursa Malaysia and the Financial Services Authority of Indonesia (OJK) may draw on the comparative evidence to assess whether more specific reporting guidance on e-waste is warranted, and to identify the industries in which reporting is weakest.

For companies and their boards, the study identifies the governance characteristics associated with more extensive e-waste disclosure. These findings are directly actionable, as board composition, meeting frequency, gender diversity and the establishment of a sustainability steering committee all lie within the control of the firm. Boards seeking to strengthen their environmental accountability may therefore draw on the findings when reviewing their own structures.

For investors, analysts and civil society organisations, the study provides a benchmark of current reporting practice in two markets. Where disclosure is shown to be thin or uneven, these stakeholders are better placed to press for improvement and to interpret the absence of e-waste reporting as itself informative.

1.5.2 Theoretical Significance

Theoretically, the study extends Stakeholder Theory into a reporting domain in which it has not been widely tested. Prior applications of the theory in the disclosure literature have concentrated on carbon emissions, general environmental reporting and corporate social responsibility. E-waste differs from these domains in that it carries a direct and locally visible health burden, borne disproportionately by informal workers

and communities living near disposal sites. This distinction sharpens the question of whose interests the board responds to when determining what to report.

The comparative design offers a further contribution by testing whether the governance-disclosure relationship holds across two distinct institutional settings. Malaysia operates a unitary board structure under a comply or explain code, whereas Indonesia operates a two-tier structure that separates supervisory and executive functions. Establishing whether the same board characteristics matter in both settings, or whether their effects are contingent on board structure and regulatory pressure, contributes to the wider debate on the transferability of Anglo-American governance findings to emerging and non-unitary contexts.

1.6 Research Scope

This study is confined to public-listed companies on Bursa Malaysia and the Indonesia Stock Exchange. Listed companies are selected for two reasons. They are subject to mandatory annual reporting obligations, which yields a consistent and publicly accessible source of disclosure data. They also command the resources required to implement and report on e-waste initiatives. Private companies, unlisted government-linked entities, and small and medium enterprises fall outside the scope.

The disclosure data are drawn from published annual reports and sustainability reports. Information disseminated through other channels, such as corporate websites, press releases and social media, is not captured. The governance variables examined are limited to board size, board independence, board meeting frequency, board gender diversity, the presence of a sustainability steering committee, institutional ownership and managerial ownership. Each of these is observable from published corporate disclosures.

The study measures disclosure rather than performance. It does not verify whether the e-waste practices reported by companies are actually implemented, nor does it quantify the volume of e-waste generated by each company. The findings should

therefore be interpreted as evidence on reporting behaviour and its governance determinants, rather than as an assessment of environmental outcomes.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter begins by defining e-waste, together with its categorisation and implications. It then outlines the e-waste situation in Malaysia and Indonesia. The discussion proceeds to e-waste information disclosure and corporate governance in both countries. The chapter then reviews prior studies linking corporate governance to e-waste information disclosure. It concludes with the underpinning theory of the study, namely Stakeholder Theory.

2.2 E-Waste

The Basel Convention (Basel Convention, n.d) defines e-waste as electrical and electronic equipment that is waste, including all components, sub-assemblies and consumables that are part of the equipment at the time the equipment becomes waste. Also known as WEEE (waste electrical and electronic equipment), it is one of the fastest-growing waste streams in the world (Basel Convention, n.d.). The United Nations, through the United Nations University (UNU), categorises e-waste into six classifications: (1) small equipment; (2) large equipment; (3) temperature exchange equipment; (4) screens and monitors; (5) lamps; and (6) small IT and telecommunication equipment (Forti et al., 2020).

E-waste has significant negative effects on the environment and human health, largely due to the hazardous materials it contains. According to the Global E-Waste Monitor Report 2024, e-waste includes many harmful substances such as lead, mercury, cadmium, brominated flame retardants and other toxic chemicals that can leach into soil and water if not properly managed (Baldé et al., 2024). When e-waste is disposed of in landfills or open dumps, these dangerous substances can contaminate groundwater and surface water, affecting ecosystems and food chains (Grant et al., 2013). Improper handling and informal recycling practices, which are common in developing countries, release toxic fumes and dust into the air, contributing to air pollution and respiratory illnesses among workers and nearby communities (Forti et al., 2020). Harmful

chemicals from e-waste can persist in the environment and accumulate in plants and animals, leading to long-term ecological damage (Honda et al., 2016).

Empirical studies consistently show that exposure to e-waste has harmful effects not only on the environment, but on human health as well. A study conducted in China revealed that residents, particularly children, had elevated levels of heavy metals such as lead in their bodies. The elevated lead exposure was associated with problems affecting the nervous systems, immune system, and cardiovascular system, as well as signs of DNA damage (Huang et al., 2021). A similar study conducted in Thailand revealed that e-waste workers experienced more physical symptoms, including headaches, muscle pain, and skin disorders, compared to individuals not directly involved in e-waste processing (Sangwijit et al., 2025). These findings suggest that repeated and long-term exposure to toxic substances released during e-waste dismantling and burning can negatively affect multiple body systems. A more recent study in China found that exposure to cadmium from e-waste disrupted normal hormonal development, thereby affecting endocrine function in children (Wang et al., 2026).

According to the Global E-Waste Monitor Report 2024 (Baldé et al., 2024), globally, e-waste has reached an alarming level. In the year 2022, the world generated 62 million metric tonnes (Mt) of e-waste, an increase from 53.6 Mt in 2019, representing a rapid growth rate of about 2.6 Mt per year. More concerning is that only about 22.3% of this e-waste was formally collected and recycled in an environmentally sound manner (Baldé et al., 2024). The remaining was either undocumented, dumped, traded, or treated under unsafe conditions. The report further projects that global e-waste could reach 82 million tonnes by 2030 if current trends continue. These statistics clearly indicate that the global e-waste situation is highly alarming, especially because recycling efforts are not keeping pace with the rapid increase in e-waste generation.

From the same report, it is revealed that Asia is the largest contributor to global e-waste generation, with approximately 30 Mt in 2022, or nearly half of the world's total e-waste (Baldé et al., 2024). Despite this alarming figure, Asia's formal collection and recycling rate remains relatively low compared to the volume produced. The

increase is driven largely by a large population, rapid economic growth, increasing digitalisation and heavy use of electronic devices.

These figures are not trivial. The projected 82 Mt by 2030 implies greater environmental pollution worldwide, including contamination of soil, water and air by hazardous substances. Poorly managed e-waste will also continue to pose health risks to informal workers and to communities living near dumping areas. This trajectory provides a strong motivation for the present study, which examines whether large organisations in Malaysia and Indonesia manage their e-waste responsibly and report those practices to their stakeholders.

2.2.1 E-Waste in Malaysia

The body of literature on e-waste in Malaysia has grown steadily over the past decade, reflecting increasing concern among researchers, policymakers and industry players. Earlier studies focused mainly on defining e-waste, identifying hazardous components and assessing public awareness. More recent studies have adopted broader and more analytical approaches, including behavioural analysis, material flow analysis (MFA) and life cycle assessment (LCA). Many researchers agree that Malaysia faces a dual challenge. It must manage the rising volume of locally generated e-waste arising from rapid technological consumption, while also addressing the illegal importation of e-waste from other countries (Ya'acob et al., 2023). In addition, industrial e-waste is relatively well managed under the scheduled waste regulations, whereas household e-waste management remains weak and poorly structured (Alias et al., 2014). Overall, the literature indicates a transition from descriptive studies towards more solution-oriented research centred on sustainability and circular economy practices.

Within this global picture, Malaysia is a significant regional generator. The Global E-waste Monitor 2020 reported that Malaysia produced approximately 364 kilotonnes of e-waste, equivalent to about 11.1 kilogrammes per capita (Forti et al., 2020). The 2024 edition indicates that generation has since risen to roughly 411 thousand tonnes annually, placing Malaysia among the higher per capita generators in ASEAN (Baldé et al., 2024). Both editions attribute the increase to the same underlying

drivers, namely higher consumption of electrical and electronic equipment, shorter product lifespans and a limited culture of repair. The comparison between the two editions is instructive. Generation has continued to climb while formal collection has not kept pace, so the gap between what is discarded and what is safely recovered has widened rather than narrowed. For Malaysia, the consequence is a substantial loss of recoverable materials, including precious metals, together with heightened environmental risk from e-waste diverted into informal channels.

Local studies corroborate this assessment and locate the weakness in a specific part of the system. Industrial e-waste is comparatively well controlled under the scheduled waste regime. Household e-waste, by contrast, remains largely outside any formal collection infrastructure and is frequently disposed of with general municipal waste or sold to informal collectors (Alias et al., 2014; Yun et al., 2019). Enforcement difficulties surrounding illegal imports compound the domestic problem, since e-waste entering the country through unofficial channels is absorbed into the same under-regulated informal sector (Ya'acob et al., 2023).

A first strand of the Malaysian literature examines the management system itself. Yun et al. (2019) reviewed e-waste management and recycling activity in Malaysia through document analysis, policy review, and site visits to regulatory agencies and licensed recovery facilities. They found that industrial e-waste is governed by a reasonably developed scheduled waste framework, whereas household e-waste management remains weak and poorly organised. Most recovery is carried out in semi-formal settings using hydrometallurgical methods to extract gold and copper. These processes are neither fully efficient nor free of energy and residue problems. Low public awareness, the continued involvement of informal collectors, and the declining material value of newer devices further undermine the system. Shad et al. (2020) reached a broadly similar conclusion from the perspective of environmental and health consequences. They attributed the worsening situation to weak regulation, limited awareness, and inconsistent enforcement rather than to any absence of legislation. Taken together, these studies frame Malaysia's difficulty as one of implementation rather than of legal design.

A second and larger strand investigates consumer behaviour and public awareness, typically through the Theory of Planned Behaviour. Shaharudin et al. (2020) surveyed youth in Putrajaya. They found that perceived convenience and perceived policy effectiveness were the significant predictors of intention to dispose of portable e-waste properly, and that intention in turn predicted actual disposal behaviour. Mohamad et al. (2022) extended the model to Malaysian consumers more generally and identified moral obligation as the strongest determinant of recycling intention, followed again by perceived convenience. Their multi-group analysis further indicated that respondents with lower and middle levels of education were more readily influenced towards recycling behaviour than those with higher education. Mohd Yahya et al. (2022) approached the question demographically among residents of Selangor. They found educational attainment, occupation and income to be the characteristics most strongly associated with understanding of e-waste recycling. The convergent message across these studies is that awareness alone is insufficient. Convenience of access, together with credible policy signals, is what translates intention into behaviour.

Attention has also turned to institutional generators. Hashim et al. (2024) surveyed 241 students across selected Malaysian public universities. Most respondents stored malfunctioning devices at home rather than disposing of them through any formal channel. The most critical constraint identified was knowledge, followed by education and training. The authors therefore recommended stronger institutional policies, expanded awareness efforts and greater student involvement. The finding is notable because universities are both substantial generators of e-waste and settings in which disposal habits are formed. It suggests that the behavioural barriers documented in household studies persist even among relatively well-educated populations.

A third and more recent strand shifts the unit of analysis from individuals to organisations. Studies of corporate sustainability reporting indicate that some Malaysian listed companies have begun to include e-waste in their disclosures, although the level of reporting remains low and inconsistent (Abd-Mutalib et al., 2021). Extending this work from disclosure to practice, Abd-Mutalib et al. (2025) combined survey and interview evidence from Bursa Malaysia listed firms in the technology and telecommunications sectors. They found that internal factors, particularly top management commitment, exert the strongest influence on e-waste management

practices, while the influence of external factors is contingent on whether the firm has adopted an eco-efficiency strategy. This finding is significant for the present study because it locates the determinants of corporate e-waste behaviour inside the organisation, in the commitment and orientation of those who direct it, rather than solely in external regulatory pressure.

Alongside this organisational turn, researchers have pointed to the potential of digital technologies such as the Internet of Things and artificial intelligence to improve the tracking, sorting and recovery of e-waste. Concerns about illegal e-waste imports and informal recycling activity nevertheless persist. Scholars broadly agree that Malaysia requires stronger enforcement mechanisms, closer international cooperation, and a more holistic approach involving government, industry and the public.

In summary, the Malaysian literature has moved from descriptive accounts of the e-waste problem, through behavioural explanations of household disposal, towards the role of organisations and their governance. What remains comparatively unexamined is the reporting dimension. Only a small number of studies address what listed companies actually disclose about their e-waste practices, and fewer still consider why disclosure varies between firms operating under identical regulatory conditions. That gap is taken up in Section 2.3 and developed further in Section 2.5.

2.2.2 E-Waste in Indonesia

Literature on e-waste in Indonesia has grown considerably over the past decade. This growth is driven largely by the country's position as the fourth most populous nation in the world and one of the fastest-growing consumer electronics markets in Southeast Asia. In the Indonesian context, e-waste is commonly referred to as *"sampah elektronik"* or *"limbah elektronik"*. Both the academic literature and the national media use these terms interchangeably to describe discarded electrical and electronic equipment originating from households, offices and industries. In Malaysia, e-waste discourse has been shaped mainly by the Environmental Quality Act 1974 and the Department of Environment's e-waste inventory. The Indonesian discussion, by contrast, is embedded within the broader regulatory framework of hazardous and toxic

waste, known locally as "*Bahan Berbahaya dan Beracun"* (B3), and within the more recent category of specific waste "(*sampah spesifik*)".

In terms of magnitude, the Global E-waste Monitor series provides the most consistent benchmark for tracking Indonesia's e-waste generation. The Global E-waste Monitor 2020 reported that Indonesia generated approximately 1,618 kilotonnes of e-waste, already among the highest volumes in Southeast Asia (Forti et al., 2020). Earlier estimates placed generation at 1,274 kilotonnes, or about 4.9 kilogrammes per capita, in 2016 (Baldé et al., 2017). The Global E-waste Monitor 2024 indicates a further deterioration, with Indonesia generating approximately 1.9 million tonnes of e-waste in 2022 (Baldé et al., 2024). This figure must be read against the global picture reported in the same edition. A record 62 million tonnes of e-waste was generated worldwide in 2022, of which only 22.3% was documented as formally collected and recycled in an environmentally sound manner, with Asia alone accounting for close to 30 million tonnes (Baldé et al., 2024). Indonesia therefore sits within a regional bloc that generates the largest absolute volume of e-waste but has the weakest formal collection infrastructure. This pattern mirrors the challenges documented in the Malaysian literature discussed in the preceding section.

National data sources reinforce this picture. The Ministry of Environment and Forestry "(*Kementerian Lingkungan Hidup dan Kehutanan*)" (KLHK) recorded approximately two million tonnes of e-waste generated in 2021, of which only around 17.4% was properly managed. The remainder was either stored in households or disposed of in landfills mixed with general municipal waste (Waste4Change, 2022). The distribution of this waste is also highly uneven. The island of Java alone contributed about 56% of national e-waste generation, followed by Sumatra at approximately 22%, reflecting the concentration of population, income and electronic consumption in the western part of the archipelago (Mairizal et al., 2021; Indonesia Environment and Energy Center, 2024). Using a multivariate input-output and Weibull lifespan model, Mairizal et al. (2021) projected that Indonesia's e-waste generation will rise from around 2.0 million tonnes in 2021 to 3.2 million tonnes by 2040, equivalent to an increase from 7.3 to 10 kilogrammes per capita. They further estimated that the recoverable value of key metals such as copper, gold, silver, platinum and palladium will grow from about USD 2.2 billion to USD 14 billion over the same period. These

projections are frequently cited in Indonesian policy discussions as evidence that e-waste is simultaneously an environmental liability and an untapped economic resource.

The policy and regulatory landscape provides important context for understanding how Indonesia frames the e-waste issue. Indonesia does not yet have a single dedicated statute governing electronic waste. Instead, e-waste is regulated through a combination of general waste and hazardous waste instruments. The principal instruments are Law No. 18 of 2008 on Waste Management "(*Undang-Undang Nomor 18 Tahun 2008 tentang Pengelolaan Sampah*)", Government Regulation No. 101 of 2014 on the Management of Hazardous and Toxic Waste "(*Peraturan Pemerintah Nomor 101 Tahun 2014*)", Presidential Regulation No. 97 of 2017 on the National Policy and Strategy for the Management of Household Waste, Government Regulation No. 27 of 2020 on the Management of Specific Waste "(*Peraturan Pemerintah Nomor 27 Tahun 2020 tentang Pengelolaan Sampah Spesifik*)", and Government Regulation No. 22 of 2021 on the Implementation of Environmental Protection and Management. More recently, Ministerial Regulation of the Ministry of Environment and Forestry No. 9 of 2024 on the Management of Waste Containing Hazardous and Toxic Materials expressly identifies electronic goods as a regulated waste stream and imposes reduction and handling obligations on waste generators (Dinas Lingkungan Hidup DKI Jakarta, 2024; Waste4Change, 2022).

Among these, Government Regulation No. 27 of 2020 is regarded in the literature as the most significant development for e-waste specifically. It classifies discarded electronic equipment as specific waste requiring special handling, and divides management obligations into two pillars. The first is reduction "(*pengurangan*)" through limiting waste generation, recycling and reuse. The second is handling "(*penanganan*)" through sorting, collection, transportation, treatment and final processing. The regulation also introduces a form of extended producer responsibility by requiring producers to participate in managing the waste arising from their products, either by establishing their own take-back and collection facilities or by cooperating with licensed third-party processors (Waste4Change, 2022). Several Indonesian studies nevertheless observe that the framework remains fragmented and that enforcement is weak. Electronic waste is still classified broadly under the B3 regime without a dedicated instrument governing the entire e-waste chain, leaving considerable

ambiguity in management responsibilities, licensing and economic incentives (Paminto et al., 2024).

The way Indonesia perceives e-waste is shaped by this regulatory positioning and by the socio-economic realities of the informal sector. First, e-waste is officially framed as a hazardous and toxic material. Government and media communication consistently emphasises the presence of mercury, lead, cadmium, lithium and manganese in "*sampah elektronik"*, and the health risks that arise when such items are discarded together with ordinary household waste (Paminto et al., 2024). Second, e-waste is increasingly framed as a resource and a circular economy opportunity, reflected in the emphasis on urban mining, metal recovery and the economic valuation studies described above. Third, and in contrast to the more formalised discourse in Malaysia, e-waste in Indonesia is also understood as a livelihood issue. Collection and dismantling are dominated by informal collectors, scavengers and small workshops that recover valuable metals using rudimentary methods. The literature notes that the shortage of licensed recyclers has encouraged this informal handling. Such handling exposes workers and surrounding communities to serious environmental and health risks, while simultaneously providing income to a large number of households (Paminto et al., 2024; Mairizal et al., 2021).

With regard to actual treatment activities, Indonesian practice combines government-led collection schemes, producer initiatives and community-based movements. At the subnational level, the Jakarta Environment Agency "(*Dinas Lingkungan Hidup DKI Jakarta*)" has operated an e-waste programme since 2018. The programme offers two channels for residents. The first is a network of e-waste dropboxes placed at government buildings, Transjakarta shelters, commuter rail stations and other public facilities, reported at around 36 locations across the city. The second is a free household collection service for residents with at least five kilogrammes of accumulated e-waste, requested through a dedicated online portal. Collected material is then transferred under a cooperation agreement to a licensed processor, where it is dismantled to separate plastics and metals and subsequently smelted into ingots for the domestic and export markets (Dinas Lingkungan Hidup DKI Jakarta, 2024). At the national level, the government has also promoted reduction and handling through the development of TPS 3R facilities, waste banks "(*bank sampah*)" and public awareness

campaigns intended to help households recognise the specific nature of electronic waste (Paminto et al., 2024).

Civil society and the private sector play an equally visible role. The EwasteRJ community, established in 2016 and later formalised as the "*Yayasan Peduli Sampah Elektronik Indonesia"* ('Indonesian Electronic Waste Care Foundation'), has developed a voluntary dropbox network spanning more than ten cities, including Jakarta, Bogor, Depok, Tangerang, Bekasi, Bandung, Yogyakarta, Semarang, Salatiga, Surabaya, Tuban, Palembang and Makassar. Deposited items are sorted into six categories and periodically transferred to recycling companies certified by KLHK (Waste4Change, 2022; Paminto et al., 2024). Reports from the organisation indicate that information and communications technology equipment consistently constitutes the largest share of material received, and that the volume of deposits has risen year on year. This trend is interpreted as a sign of gradually improving public awareness. Manufacturers have also begun to operate take-back schemes, with several electronics brands placing collection dropboxes in retail outlets and shopping centres in Jakarta as part of voluntary recycling programmes (Waste4Change, 2022).

Taken together, the Indonesian literature portrays a country in which the volume of e-waste is rising rapidly and now approaches two million tonnes annually. The regulatory architecture exists but remains dispersed across general waste and hazardous waste instruments. Official discourse treats sampah elektronik simultaneously as a toxic hazard and as an economic resource. Actual treatment relies on a patchwork of municipal collection schemes, voluntary community dropboxes, producer initiatives and a large informal recycling sector. The parallels with Malaysia are evident, particularly the weak management of household e-waste, the dominance of informal collection, and the gap between generation and formally documented recycling. What distinguishes the Indonesian case is the sheer scale of generation, the strong geographical concentration in Java, and the comparatively greater visibility of community-driven initiatives in filling the gap left by limited formal infrastructure.

2.3 E-Waste Information Disclosure

Although studies on e-waste awareness are relatively encouraging, there is a dearth of literature on e-waste information disclosure compared with the broader research on environmental reporting. The available evidence suggests that scholarly attention to e-waste information disclosure began to emerge only in the post-COVID-19 period, coinciding with the institutional push towards sustainability reporting and the growing regulatory emphasis on environmental, social and governance matters. The limited evidence may also reflect a perception that e-waste constitutes a narrow operational concern rather than a material sustainability issue, together with the absence of any mandatory requirement compelling firms to report on it.

Among the earliest studies on e-waste information disclosure was that by Nik Azman and Mohd Salleh (2020). The study examined 789 Malaysian public-listed companies (PLCs), by collecting the data of e-waste information disclosure from Thompson Reuters Database. The results reveal that only 59 of the 789 firms disclosed e-waste information. With regard to the extent of disclosure, there was a substantial gap between the firms under study, where the minimum score for e-waste information disclosure was 0.00%, while the highest score showed 97.30% of disclosure. The mean score was 57.98% indicating a moderate disclosure of e-waste information among Malaysian PLCs. The authors concluded that the low reporting of e-waste might be the result of no mandatory requirement and lack of awareness among the PLCs with regard to e-waste management.

Another study by Abd-Mutalib et al. (2021) examined e-waste information disclosure by Malaysian PLCs, but focusing on firms in the technology and telecommunication industry. The two industries were chosen as there was evidence that the activities of these two industries are highly related to the use of electronic appliances (Bursa Malaysia, 2018), thus may lead to the high production of e-waste. A number of 92 firms were chosen for the study. The results indicated that only 23.53% of firms in the telecommunication industry and 14.67% of firms in the technology industry disclosed e-waste information in their annual reports. In terms of the extent of disclosure, the firms under study indicated a mean of only 11.36 words and 0.41 sentences, which points to a low level of disclosure. Furthermore, the disclosure did not

provide much information, as it was confined to general qualitative statements. The study also revealed that firms listed on the Main Market disclose more e-waste information than firms listed on the ACE Market, signifying that larger and more financially sound firms take more serious actions with regard to their e-waste management. This may be because such firms recognise the risks they face if e-waste is not managed properly. The study, however, did not find any statistically significant difference between the two industries.

Ab-Aziz et al. (2023) conducted a study on e-waste information disclosure among Malaysian PLCs across 13 industries. E-waste information was examined using three measurements: number of words and sentences for the extent of reporting, and the quality of reporting. Using the annual reports of 274 companies, the study found that four industries recorded the highest disclosure of e-waste, in both extent and quality, namely the telecommunications and media, technology, financial services and utilities industries. The study concluded that e-waste information disclosure among Malaysian PLCs is still considered low in extent and poor in quality; however, the findings may shed some light on how to encourage better e-waste management and reporting among Malaysian large organisations.

In a more recent study, the level of e-waste information disclosure is examined not only in terms of the extent and quality of disclosure, but also in terms of whether the information revealed the type of news, namely "good news", "bad news" or neutral, and the location of such disclosure (Nik Azman et al., 2024). Consistent with past studies (Ab-Aziz et al., 2023; Abd-Mutalib et al., 2021; Nik Azman & Mohd Salleh, 2020), the results from this study revealed the highest number of sentences on e-waste information disclosure by telecommunications and media, technology and financial services industries. More notably, industries such as construction, energy, and real estate investment trusts also project among the highest levels of e-waste information disclosure. With regard to the type of news, 60% of the firms under study reported good news, while 2% reported bad news and 38% reported neutral news. The predominance of good news suggests that firms prefer showing positive e-waste management practices and being cautious in disclosing negative aspects of e-waste management practices to avoid reputational damage (Nik Azman et al., 2024). Meanwhile, the location of e-waste information disclosure was found mainly on the Sustainability

Reporting section in the annual reports, or in the stand-alone Sustainability Reporting reports.

Taken together, the literature on e-waste information disclosure remains small but consistent in its findings. Across the Malaysian studies reviewed, the level of disclosure is uniformly low in extent and poor in quality. It is concentrated within a narrow group of industries dominated by telecommunications and media, technology and financial services. It is also weighted towards positive or neutral narrative rather than a balanced account of environmental performance. The explanation offered most frequently is the absence of a mandatory reporting requirement, compounded by limited awareness of e-waste as a material sustainability concern. What this literature has yet to establish is why the extent and quality of disclosure vary so markedly between firms operating under the same regulatory conditions. This unresolved variation points towards firm-level governance characteristics as a plausible explanatory factor, which forms the focus of the following section.

2.4 Corporate Governance

Corporate governance refers to the system of rules, practices and processes by which a company is directed and controlled, and through which the interests of its various stakeholders are balanced. The concept was popularised in the Cadbury Report, which defined corporate governance as the system by which companies are directed and controlled, and placed the board of directors at the centre of that system (Cadbury, 1992). The theoretical origins of the field lie in agency theory. This theory recognises that the separation of ownership from control creates a divergence of interest between owners and managers, and gives rise to monitoring and bonding costs (Jensen & Meckling, 1976). Fama and Jensen (1983) extended this reasoning by arguing that effective boards perform a decision-control function that constrains managerial opportunism. More contemporary formulations broaden the frame beyond the shareholder-manager relationship. The G20/OECD Principles of Corporate Governance emphasise that sound governance should recognise the rights of stakeholders and encourage active cooperation between corporations and stakeholders in creating wealth and sustainable enterprises (OECD, 2015). This broader conception

is consistent with the stakeholder theory that underpins the present study, in which the board is treated as the mechanism through which competing stakeholder claims, including environmental claims, are mediated and made visible through disclosure.

In Malaysia, corporate governance is regulated through a combination of statutory requirements, listing rules and a comply-or-explain code. The Companies Act 2016 establishes directors' statutory duties, while the Bursa Malaysia Main Market and ACE Market Listing Requirements impose disclosure obligations on listed issuers. The principal soft-law instrument is the Malaysian Code on Corporate Governance, first issued in 2000 and most recently revised in 2021. The Code sets out best practices on board leadership and effectiveness, audit and risk management, and stakeholder communication (Securities Commission Malaysia, 2021). Importantly for the present study, the latest revision places explicit emphasis on the board's responsibility for sustainability governance. Boards are required to integrate sustainability considerations into corporate strategy and to oversee the management of material sustainability risks. This is reinforced by Bursa Malaysia's Sustainability Reporting Framework, which requires listed issuers to disclose material economic, environmental and social risks and opportunities in their annual reports (Bursa Malaysia, 2018).

Indonesia operates a materially different governance architecture, which is significant for the comparative dimension of this study. Indonesian listed companies adopt a two-tier board structure. It comprises a Board of Commissioners (Dewan Komisaris) exercising supervisory functions and a Board of Directors (Direksi) exercising executive functions, in contrast to the unitary board found in Malaysia. Governance practice is guided by the General Guidelines of Good Corporate Governance issued by the National Committee on Governance (Komite Nasional Kebijakan Governance, 2006). It is regulated by the Financial Services Authority (*Otoritas Jasa Keuangan*, OJK), notably through Regulation No. 21/POJK.04/2015 on the Implementation of Corporate Governance Guidelines for Public Companies (Otoritas Jasa Keuangan, 2015). On the sustainability side, OJK Regulation No. 51/POJK.03/2017 on the Implementation of Sustainable Finance requires financial institutions, issuers and public companies to prepare and submit an annual sustainability report. Indonesian sustainability disclosure therefore rests on a more explicitly mandated basis than the largely framework-driven Malaysian regime (Otoritas Jasa

Keuangan, 2017). These institutional differences provide a meaningful basis for comparing how governance attributes translate into e-waste information disclosure across the two jurisdictions.

Corporate governance matters to disclosure because the board controls both the supply of and the incentive for corporate information. Under agency reasoning, disclosure is a monitoring device that reduces information asymmetry between managers and providers of capital, and stronger boards are expected to demand more of it (Eng & Mak, 2003). Under stakeholder reasoning, disclosure is a means of demonstrating responsiveness to non-shareholder constituencies and of maintaining organisational legitimacy. Boards facing broader stakeholder scrutiny will therefore disclose more extensively on environmental and social matters (Haniffa & Cooke, 2005). Both perspectives converge on the same empirical prediction, namely that observable board and ownership characteristics should explain variation in voluntary disclosure. On this basis, the present study treats governance attributes as candidate determinants of e-waste information disclosure. The following section reviews the evidence for each attribute in turn.

2.5 Corporate Governance and E-Waste Information Disclosure

Research linking corporate governance attributes to environmental disclosure is well established, even though its application to e-waste specifically remains embryonic. A substantial body of international evidence demonstrates that board composition and ownership structure shape the extent and quality of voluntary environmental reporting. Liao et al. (2015) found that boards with greater gender diversity, a higher proportion of independent directors and a dedicated environmental committee were significantly more likely to disclose greenhouse gas information, and to do so more extensively. Peters and Romi (2014) reported comparable results for environmental risk disclosure. Rupley et al. (2012) showed that governance quality is associated with the quality, and not merely the volume, of environmental disclosure. Within Southeast Asia, Haniffa and Cooke (2005) established that board characteristics and ownership structure influence corporate social reporting among Malaysian listed firms. Subsequent Malaysian studies have confirmed that governance variables remain significant

predictors of social and environmental disclosure (Esa & Mohd Ghazali, 2012; Said et al., 2009).

E-waste information disclosure, however, has attracted far less attention as a dependent variable. The small Malaysian literature reviewed in the preceding section has begun to test firm and board characteristics against e-waste disclosure. These studies report that governance attributes explain part of the observed variation, although the findings are not consistent (Ab-Aziz et al., 2023; Abd-Mutalib et al., 2021). No comparable body of work exists for Indonesia, despite the larger scale of the country's e-waste problem and the more prescriptive sustainability reporting regime introduced through OJK Regulation No. 51/POJK.03/2017. This absence of comparative evidence is the gap the present study addresses.

Because the e-waste specific evidence is thin, the discussion that follows draws on the broader environmental and sustainability disclosure literature, on the reasonable assumption that the governance mechanisms that drive environmental reporting generally will also operate on the narrower e-waste dimension. Each subsection below examines one governance attribute, sets out the theoretical rationale linking it to disclosure, and reviews the empirical evidence reported to date. The corresponding hypotheses are formally developed in Chapter Three.

2.5.1 Board size and e-waste information disclosure

Board size refers to the total number of directors serving on the board, and is among the most frequently examined governance attributes in the disclosure literature. Two competing arguments exist. Resource dependence and stakeholder reasoning suggest that larger boards bring a wider range of expertise, experience and external connections. This increases the board's capacity to recognise and respond to diverse stakeholder demands, including environmental ones (Liao et al., 2015). A larger board is also more likely to include at least one director with environmental or sustainability expertise, and is therefore better positioned to appreciate the materiality of an issue such as e-waste. The opposing argument, grounded in agency theory, holds that larger boards

suffer from coordination difficulties, diffusion of responsibility and slower decision-making, which weakens their monitoring effectiveness (Jensen & Meckling, 1976).

The empirical evidence reflects this theoretical ambiguity. Several studies report a positive association between board size and environmental or social disclosure, consistent with the resource-based view of board capacity (Jizi, 2017; Ntim & Soobaroyen, 2013). Malaysian evidence has similarly documented a positive relationship between board size and corporate social reporting (Said et al., 2009). Other studies find the relationship to be insignificant once firm size and industry are controlled for, suggesting that board size may proxy for organisational scale rather than exercise an independent effect. Within the e-waste literature specifically, the evidence remains preliminary, and board size is among the attributes for which Malaysian findings have been mixed (Abd-Mutalib et al., 2021).

2.5.2 Board independence and e-waste information disclosure

Board independence is conventionally measured as the proportion of independent non-executive directors on the board. Agency theory positions independent directors as the primary internal monitoring mechanism. Directors without executive or financial ties to management are better placed to constrain managerial discretion and to insist on transparency (Fama & Jensen, 1983). Independent directors also carry reputational capital in the external labour market, which gives them a personal incentive to be associated with firms perceived as transparent and responsible. From a stakeholder perspective, independent directors are more likely to represent the interests of constituencies beyond the controlling shareholder, including regulators, communities and environmental interest groups. They are therefore expected to advocate for broader disclosure.

Empirical support for this proposition is reasonably strong in the environmental context. Liao et al. (2015) found that boards with a higher proportion of independent directors were significantly more likely to disclose greenhouse gas information. Jizi (2017) reported a positive association between board independence and sustainable development disclosure, and Rupley et al. (2012) similarly linked independent board

composition to higher-quality environmental disclosure. The Malaysian evidence is more equivocal. Some studies find a positive relationship between independent directors and corporate social disclosure (Esa & Mohd Ghazali, 2012), while others report insignificant results. This pattern is often attributed to the concentrated ownership structures prevalent in Malaysian listed firms, which may limit the practical independence of nominally independent directors.

2.5.3 Board meeting and e-waste information disclosure

Board meeting frequency is used in the literature as a proxy for board diligence and the intensity of monitoring activity. The underlying logic is that boards meeting more often have greater opportunity to review management proposals, interrogate performance data and deliberate on emerging risks. Such boards are therefore more likely to identify environmental exposures and to require that they be reported (Laksmana, 2008). Frequent meetings also signal an active rather than ceremonial board, and stakeholder theory suggests that active boards will be more attentive to the informational demands of external constituencies.

Evidence on this attribute is somewhat weaker than for board independence. Laksmana (2008) found that boards meeting more frequently disclosed more extensively on compensation practices, and comparable results have been reported for environmental and social reporting (Ntim & Soobaroyen, 2013). A competing interpretation holds that frequent meetings are reactive rather than proactive, convened in response to crisis or poor performance. On that view, a negative or insignificant association with voluntary disclosure would be expected. The literature therefore treats meeting frequency as a measure of board activity whose directional effect on disclosure remains an empirical question. No study to date has tested it against e-waste disclosure in either Malaysia or Indonesia.

2.5.4 Board gender diversity and e-waste information disclosure

Board gender diversity, typically measured as the proportion of female directors, has become one of the most actively researched governance attributes in the sustainability disclosure literature. The theoretical case rests on several strands. Diversity broadens the range of perspectives available to the board and reduces the risk of groupthink, improving the quality of deliberation on complex, non-financial issues. Socialisation and ethical-orientation research further suggests that female directors are on average more attentive to stakeholder concerns, more risk-averse in relation to reputational exposure, and more supportive of philanthropic and environmental commitments. From a stakeholder perspective, a diverse board is also more representative of the wider community, and therefore more responsive to community expectations regarding environmental stewardship.

The empirical evidence is comparatively consistent. Liao et al. (2015) found a significant positive association between the percentage of female directors and both the propensity to disclose greenhouse gas information and the extensiveness of that disclosure. Ben-Amar et al. (2017) reported that the likelihood of voluntary climate change disclosure increases with the proportion of women on the board. They also found support for critical mass theory, which holds that the effect of gender diversity strengthens once female representation passes a threshold of roughly three directors. Jizi (2017) similarly documented a positive relationship between gender diversity and sustainable development disclosure. Board gender diversity carries particular policy salience in the Malaysian and Indonesian settings, as both jurisdictions have adopted diversity targets. The Malaysian Code on Corporate Governance now recommends that large listed companies have at least 30% women directors (Securities Commission Malaysia, 2021).

2.5.5 Sustainability steering committee and e-waste information disclosure

A sustainability steering committee, variously described in the literature as a sustainability, environmental or corporate social responsibility committee, is a board-level or board-mandated body. It is charged with overseeing the firm's sustainability

strategy, performance and reporting. Its existence signals that sustainability has been institutionalised within the governance structure rather than left as an operational afterthought. The theoretical argument is that a dedicated committee concentrates expertise, allocates agenda time that would otherwise be crowded out by financial matters, and creates a formal channel through which environmental information flows to the board. Stakeholder theory adds that establishing such a committee is itself a visible response to stakeholder expectations and a means of building environmental legitimacy.

Empirical findings largely support this expectation, albeit with an important qualification. Peters and Romi (2014) found that the presence of environmental governance mechanisms, including sustainability committees, was associated with greater voluntary disclosure of greenhouse gas information. Liao et al. (2015) reported that firms with a board-level environmental committee showed a higher tendency towards environmental transparency. They cautioned, however, that where the committee is not sufficiently large, independent or active, its effect becomes insignificant. This qualification suggests that the mere existence of a committee may operate as a symbolic rather than substantive mechanism, a concern raised directly in the environmental legitimacy literature. For e-waste specifically, a sustainability committee is the governance body most likely to identify electronic waste as a material issue, given that e-waste sits at the intersection of operational waste management, product stewardship and supply chain responsibility.

2.5.6 Institutional ownership and e-waste information disclosure

Institutional ownership refers to the proportion of shares held by institutional investors such as pension funds, unit trusts, insurance companies and sovereign investment vehicles. Institutional investors are generally regarded as sophisticated, long-horizon owners with both the incentive and the capability to monitor management. Their monitoring is expected to translate into pressure for greater transparency. In the environmental context, this expectation is reinforced by the growth of responsible investment mandates and by investor-led initiatives such as the Carbon Disclosure Project, which explicitly request environmental information on behalf of institutional

signatories. Stakeholder theory frames institutional investors as a powerful and salient stakeholder group whose informational demands the board cannot easily ignore.

Empirical evidence broadly supports a positive association. Cormier et al. (2005) found that ownership structure and public pressure jointly shape the quality of environmental disclosure among large German companies. Oh et al. (2011) reported that institutional ownership is positively related to corporate social responsibility performance in Korean firms, and Ntim and Soobaroyen (2013) similarly documented that ownership characteristics influence voluntary social disclosure. A qualification frequently raised is that not all institutional investors behave identically, and that transient institutions focused on short-term returns may exert little or no pressure for non-financial disclosure. This distinction is particularly relevant in Malaysia and Indonesia, where institutional shareholding is often held by state-linked investment bodies. The objectives of such bodies extend beyond financial return to include national development and social outcomes, a configuration that may strengthen rather than weaken the predicted relationship.

2.5.7 Managerial ownership and e-waste information disclosure

Managerial ownership refers to the proportion of shares held by executive directors and senior management. Agency theory offers the convergence-of-interest argument. Under this argument, managerial shareholding aligns the interests of managers with those of outside owners, reduces agency conflict, and therefore reduces the need for disclosure as a monitoring device. On this reasoning, higher managerial ownership would be associated with less voluntary disclosure, because the demand for external monitoring falls as ownership and control converge (Eng & Mak, 2003). A competing entrenchment argument holds that substantial managerial shareholding insulates executives from market discipline and enables them to withhold information that might attract external scrutiny. This also predicts a negative relationship, but through a different mechanism.

The empirical evidence in the disclosure literature tends to support a negative or insignificant association. Eng and Mak (2003) found that managerial ownership was

inversely related to voluntary disclosure. Mohd Ghazali (2007) reported comparable Malaysian evidence, showing that companies with higher director ownership disclosed less corporate social responsibility information than those with more dispersed ownership. Ntim and Soobaroyen (2013) likewise found that ownership concentration constrains voluntary social disclosure. The environmental disclosure literature has been less conclusive, with some studies reporting no significant relationship once firm size and profitability are controlled for. Both Malaysian and Indonesian listed firms are characterised by concentrated and frequently family-linked ownership. Managerial ownership is therefore a theoretically important attribute to examine in the e-waste disclosure setting, where the costs of disclosure are borne by insiders while the benefits accrue largely to external stakeholders.

2.6 Stakeholder Theory

Stakeholder theory is a management and organisational theory that explains how organisations create value by considering the interests of all parties affected by their activities, rather than focusing solely on shareholders. The term "stakeholder" refers to individuals or groups such as employees, customers, suppliers, governments, investors, and local communities who can influence or be influenced by organisational decisions. The theory proposes that organisations achieve long-term success when they effectively manage relationships with these stakeholders and balance their competing interests. Freeman (1984) argued that managers have responsibilities not only to shareholders but also to wider stakeholder groups that contribute to organisational survival and legitimacy. Stakeholder theory has become highly influential in business ethics, corporate governance, and strategic management because it supports accountability, ethical decision-making, and sustainable value creation (Donaldson & Preston, 1995; Freeman, 1984). In the Malaysian context, stakeholder theory has also been applied to explain sustainability disclosure practices and stakeholder engagement among public listed companies, particularly regarding environmental and social reporting. Malaysian studies have found that organisations increasingly disclose sustainability information in order to respond to stakeholder expectations and enhance corporate legitimacy (Hamzah & Abdullah, 2018; Ngu & Amran, 2021).

Stakeholder theory originated in the 1980s as a response to traditional shareholder-focused management theories that emphasised profit maximisation as the primary corporate objective. The theory was formally introduced by R. Edward Freeman in his seminal book Strategic Management: A Stakeholder Approach published in 1984. Freeman (1984) developed the theory because organisations were operating in increasingly complex business environments where multiple groups, including governments, employees, communities, and customers, had significant influence on business success. The rise of corporate social responsibility (CSR), environmental concerns, labour rights, and public accountability during the 1970s and 1980s also contributed to the development of the theory. Freeman (1984) argued that organisations could not achieve sustainable success without recognising and managing stakeholder relationships effectively. Later scholars such as Thomas Donaldson and Lee E. Preston further strengthened stakeholder theory by categorising it into descriptive, instrumental, and normative perspectives (Donaldson & Preston, 1995). In Malaysia, the theory gained importance alongside the growth of sustainability and CSR research, especially after Bursa Malaysia introduced sustainability reporting requirements for listed companies. Malaysian researchers have since used stakeholder theory to examine how stakeholder pressure influences corporate social and environmental responsibility disclosures (Hamzah & Abdullah, 2018).

In sustainability-related research, stakeholder theory is widely used to explain why organisations adopt sustainability practices and reporting mechanisms. The theory holds that organisations respond to pressures and expectations from stakeholders who increasingly demand ethical conduct, environmental responsibility and social accountability. Disclosure is one of the principal instruments through which those expectations are addressed (Jones, 1995; Harrison et al., 2010). In the Malaysian setting, the framework has been applied across a range of sustainability domains. These include corporate social and environmental responsibility disclosure among public-listed companies (Hamzah & Abdullah, 2018), materiality determination in sustainability reporting (Ngu & Amran, 2021), sustainable supply chain performance (Thong & Wong, 2018), sustainable forest management (Walter & Weber, 2015), and ESG adoption among small and medium enterprises (Zulkefli et al., 2025). Across these studies, stakeholder pressure emerges as a consistent explanation for why organisations

disclose non-financial information and how they prioritise which information to disclose.

Stakeholder theory is adopted as the underpinning theory of the present study for two reasons. First, e-waste is essentially a stakeholder issue. The costs of mismanagement fall on communities, workers and the environment rather than on shareholders, so a shareholder-centred framework offers little reason why a firm offers little reason why a firm would report on it at all. Second, the theory connects disclosure directly to the board. If disclosure is the mechanism through which a firm responds to stakeholder expectations, then the composition and structure of the body that decides what to disclose becomes the natural explanatory variable. This reasoning links the theoretical framework to the governance attributes reviewed in Section 2.5 and to the hypotheses developed in Chapter Three.

CHAPTER 3: RESEARCH FRAMEWORK AND METHODOLOGY

3.1 Introduction

This section focuses on the methodology of collecting and analysing data. This research employs a mixed-methods approach, integrating quantitative analysis based on secondary data with qualitative insights gathered through interviews. Such an approach is deemed appropriate as it allows the study to empirically investigate corporate e-waste information disclosure practices while simultaneously gaining deeper insights into the governance mechanisms that shape these practices. By combining these two methods, the study provides a more holistic understanding of e-waste disclosure behaviour among public-listed companies (PLCs) in Malaysia and Indonesia. Prior methodological literature emphasises that mixed-methods research strengthens empirical inquiry by allowing qualitative evidence to complement and explain quantitative results, particularly in studies examining organisational behaviour and governance practices (Wallwey & Kajfez, 2023).

3.2 Research Framework

The research framework of this study is presented in Figure 3.1. Consistent with stakeholder theory, the framework treats e-waste information disclosure as the mechanism through which a firm responds to the expectations of the constituencies affected by its electronic waste. Corporate governance is treated as the structure that determines how far those expectations are perceived and acted upon. Corporate governance is accordingly positioned as the independent variable and is operationalised along two dimensions. The board dimension comprises board size, board independence, board meeting frequency, board gender diversity and the presence of a sustainability steering committee. The ownership dimension comprises institutional ownership and managerial ownership.

E-waste information disclosure is the dependent variable and is captured in two forms, namely the quantity and the quality of disclosure. The framework therefore

distinguishes between how much a firm reports and how informative that reporting is. Firm size and industry type are included as control variables, since prior studies indicate that both influence environmental disclosure behaviour independently of governance structure. The framework is tested separately on the Malaysian and Indonesian samples, which is why each hypothesis in Section 3.3 is stated in two parts. The quantitative relationships it specifies are subsequently elaborated through the interview evidence gathered under research objectives (d) and (e).

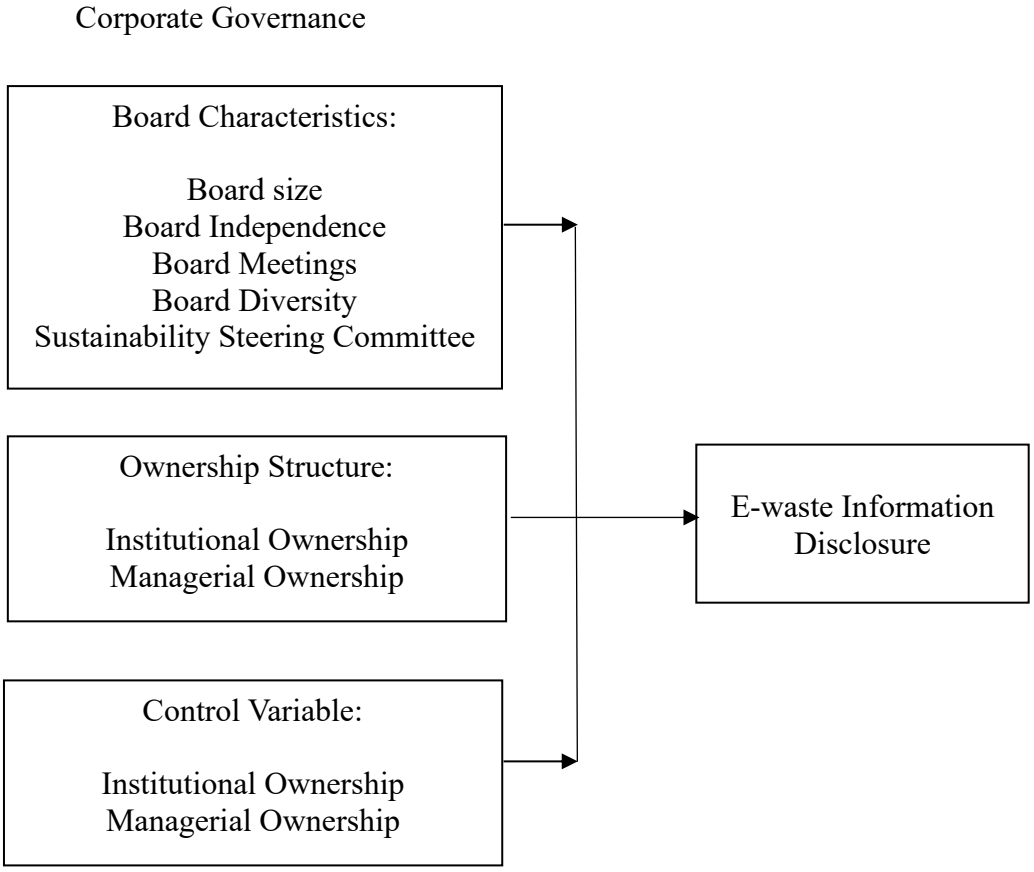

Figure 3.1: Research framework

3.3 Development of Hypotheses

This section develops each hypothesis posed in the study. Every argument begins from stakeholder theory, the underpinning theory adopted in Section 2.6. That theory holds that firms disclose non-financial information in order to respond to the expectations of the constituencies affected by their operations, and to secure the

legitimacy on which their licence to operate depends (Freeman, 1984; Donaldson & Preston, 1995). Each governance attribute is therefore theorised as a mechanism that determines how far the board perceives, weighs and responds to stakeholder claims relating to electronic waste. The theoretical argument is followed in each case by past empirical research justifying the expected relationship between the independent and dependent variables. Each subsection closes with the hypotheses, stated separately for the Malaysian and Indonesian samples.

3.3.1 Board Size and E-Waste Information Disclosure

Stakeholder theory holds that a firm secures its legitimacy and long-term viability by identifying and responding to the expectations of the constituencies affected by its operations (Freeman, 1984; Donaldson & Preston, 1995). Disclosure is the principal instrument through which those expectations are addressed, and the board is the organ that determines what is disclosed. Board size matters in this framework because it governs the breadth of stakeholder perspectives represented in the boardroom. A larger board aggregates a wider range of expertise, professional experience and external linkages. This increases the board's capacity to recognise the salience of stakeholder groups whose claims are not expressed through the capital market, such as communities, regulators and environmental interest groups (Liao et al., 2015). E-waste is precisely such a claim, as its costs fall on workers, communities and the environment rather than on shareholders. The board is therefore more likely to treat it as material where the range of interests represented extends beyond financial ones. A larger board is also more likely to include at least one director with environmental or sustainability expertise, capable of appreciating the regulatory and reputational exposure that electronic waste creates.

The empirical evidence is broadly consistent with this reasoning, although it is not unanimous. Jizi (2017) and Ntim and Soobaroyen (2013) both report a positive association between board size and environmental and social disclosure. Malaysian evidence has documented a comparable relationship with corporate social reporting (Said et al., 2009). Studies grounded in agency theory offer the competing prediction that larger boards suffer coordination costs and diffusion of responsibility that weaken

monitoring (Jensen & Meckling, 1976), and some report insignificant results once firm size and industry are controlled. Within the e-waste literature the evidence remains preliminary, and Malaysian findings have been mixed (Abd-Mutalib et al., 2021). On stakeholder grounds, however, the capacity argument is the more persuasive for a disclosure outcome. The question is whether the board can perceive and respond to a diffuse stakeholder claim, rather than whether it can discipline management efficiently. Accordingly, this study hypothesises that:

H1a: There is a positive effect of board size on e-waste information disclosure of Malaysian firms.

H1b: There is a positive effect of board size on e-waste information disclosure of Indonesian firms.

3.3.2 Board Independence and E-Waste Information Disclosure

Stakeholder theory positions independent non-executive directors as the members of the board least captured by the interests of the controlling shareholder. They are therefore the most likely to give weight to the claims of external constituencies. Directors without executive or financial ties to management have no stake in suppressing information that reflects poorly on operational performance. They also carry reputational capital in the external director labour market, which gives them a personal incentive to be associated with firms regarded as transparent and accountable (Fama & Jensen, 1983). Where the board contains a higher proportion of such directors, the balance of deliberation is expected to shift towards the interests of regulators, communities and environmental groups, and consequently towards fuller disclosure of environmental matters. E-waste disclosure is a strong test of this proposition, as it is largely voluntary in both jurisdictions and confers little direct financial benefit. The impetus to report must therefore come from directors who are responsive to non-shareholder expectations.

Empirical support in the environmental setting is reasonably strong. Liao et al. (2015) found that boards with a higher proportion of independent directors were significantly more likely to disclose greenhouse gas information. Jizi (2017) reported a positive association between board independence and sustainable development

disclosure, and Rupley et al. (2012) linked independent board composition to higher-quality environmental disclosure. Malaysian evidence is more equivocal. Some studies report a positive relationship with corporate social disclosure (Esa & Mohd Ghazali, 2012), while others find no significant effect. This pattern is commonly attributed to the concentrated ownership structures of Malaysian listed firms, which may limit the practical independence of nominally independent directors. A similar qualification applies in Indonesia, where the two-tier board structure vests oversight in a separate board of commissioners. The stakeholder rationale nonetheless predicts a positive effect in both settings, and this study hypothesises that:

H2a: There is a positive effect of board independence on e-waste information disclosure of Malaysian firms.

H2b: There is a positive effect of board independence on e-waste information disclosure of Indonesian firms.

3.3.3 Board Meeting and E-Waste Information Disclosure

Board meeting frequency is used in the literature as a proxy for board diligence and the intensity of monitoring activity. Stakeholder theory suggests that responsiveness to stakeholder claims is not automatic but requires deliberative capacity. The board must have sufficient opportunity to review management proposals, interrogate performance data and consider emerging risks before it can identify a non-financial exposure and require that it be reported (Laksmana, 2008). Boards that convene more often have more of that opportunity. Frequent meetings also signal an active rather than a ceremonial board, and an active board is more likely to engage with the informational demands of external constituencies. E-waste must first be recognised as material before it can be disclosed, and recognition is a function of the agenda time the board is able to devote to matters that do not appear in the financial statements.

The evidence on this attribute is weaker than for board independence. Laksmana (2008) found that boards meeting more frequently disclosed more extensively on compensation practices, and comparable results have been reported for environmental and social reporting (Ntim & Soobaroyen, 2013). A competing interpretation holds that frequent meetings are reactive rather than proactive, convened in response to crisis or

poor performance. On that view, a negative or insignificant association with voluntary disclosure would be expected. No study to date has tested meeting frequency against e-waste disclosure in either Malaysia or Indonesia. Consistent with the stakeholder rationale that deliberative capacity precedes responsiveness, this study hypothesises that:

H3a: There is a positive effect of board meeting frequency on e-waste information disclosure of Malaysian firms.

H3b: There is a positive effect of board meeting frequency on e-waste information disclosure of Indonesian firms.

3.3.4 Board Gender Diversity and E-Waste Information Disclosure

Stakeholder theory holds that a board is better able to respond to stakeholder claims when its composition reflects the constituencies making those claims. Gender diversity contributes to disclosure in two ways. First, it broadens the range of perspectives available in deliberation and reduces the risk of groupthink. This improves the quality of judgement on complex non-financial issues, where no single financial metric resolves the question. Second, socialisation and ethical-orientation research suggests that female directors are on average more attentive to stakeholder concerns, more averse to reputational risk, and more supportive of environmental and philanthropic commitments. A board that is more representative of the wider community is therefore expected to be more responsive to community expectations regarding environmental stewardship, of which the handling and reporting of electronic waste is a visible instance.

The empirical evidence is comparatively consistent. Liao et al. (2015) found a significant positive association between the percentage of female directors and both the propensity to disclose greenhouse gas information and the extensiveness of that disclosure. Ben-Amar et al. (2017) reported that the likelihood of voluntary climate change disclosure increases with the proportion of women on the board. They also found support for critical mass theory, under which the effect strengthens once female representation passes a threshold of approximately three directors. Jizi (2017) similarly documented a positive relationship between gender diversity and sustainable

development disclosure. The attribute carries additional policy salience in the present setting, as both jurisdictions have adopted diversity targets. The Malaysian Code on Corporate Governance recommends that large listed companies have at least 30% women directors (Securities Commission Malaysia, 2021). This study therefore hypothesises that:

H4a: There is a positive effect of board gender diversity on e-waste information disclosure of Malaysian firms.

H4b: There is a positive effect of board gender diversity on e-waste information disclosure of Indonesian firms.

3.3.5 Sustainability Steering Committee and E-Waste Information Disclosure

A sustainability steering committee is a board-level or board-mandated body charged with overseeing the firm's sustainability strategy, performance and reporting. Under stakeholder theory, the establishment of such a committee is itself a response to stakeholder expectations. It signals that sustainability has been institutionalised within the governance structure rather than left as an operational afterthought, and it builds the environmental legitimacy on which the firm's licence to operate depends. The committee also performs a substantive function. It concentrates environmental expertise, allocates agenda time that would otherwise be crowded out by financial matters, and creates a formal channel through which environmental information flows from operations to the board. E-waste is a strong candidate for the attention of such a committee, since it sits at the intersection of operational waste management, product stewardship and supply chain responsibility, and is unlikely to be identified as material by any other board body.

Empirical findings largely support this expectation. Peters and Romi (2014) found that the presence of environmental governance mechanisms, including sustainability committees, was associated with greater voluntary disclosure of greenhouse gas information. Liao et al. (2015) reported that firms with a board-level environmental committee showed a higher tendency towards environmental transparency. They also cautioned that where the committee is insufficiently large, independent or active, its effect becomes insignificant. This raises the possibility that

the committee operates symbolically rather than substantively. That caution qualifies the magnitude of the expected effect but not its direction, and this study hypothesises that:

H5a: There is a positive effect of the presence of a sustainability steering committee on e-waste information disclosure of Malaysian firms.

H5b: There is a positive effect of the presence of a sustainability steering committee on e-waste information disclosure of Indonesian firms.

3.3.6 Institutional Ownership and E-Waste Information Disclosure

Stakeholder theory distinguishes stakeholders by their salience, that is, by the power, legitimacy and urgency of their claims on the firm. Institutional investors such as pension funds, unit trusts, insurance companies and sovereign investment vehicles rank high on all three dimensions. They hold sufficient equity to influence board composition, their claims are unambiguously legitimate, and they are increasingly bound by responsible investment mandates that require them to press portfolio firms on environmental performance. The board cannot easily disregard the informational demands of such a group. Institutional investors are also long-horizon owners with the analytical capability to interpret non-financial information, which makes disclosure valuable to them rather than merely burdensome. Investor-led initiatives such as the Carbon Disclosure Project have institutionalised this demand, and e-waste falls within its scope wherever electronic equipment is material to the firm's operations or supply chain.

Empirical evidence broadly supports a positive association. Cormier et al. (2005) found that ownership structure and public pressure jointly shape the quality of environmental disclosure among large German firms. Oh et al. (2011) reported that institutional ownership is positively related to corporate social responsibility performance in Korean firms, and Ntim and Soobaroyen (2013) documented that ownership characteristics influence voluntary social disclosure. A recognised qualification is that transient institutions focused on short-term returns may exert little pressure for non-financial reporting. This qualification is less binding in the present setting. Institutional shareholding in Malaysia and Indonesia is frequently held by state-

linked investment bodies whose mandates extend beyond financial return to national development and social outcomes, a configuration that should strengthen rather than weaken the predicted relationship. Accordingly:

H6a: There is a positive effect of institutional ownership on e-waste information disclosure of Malaysian firms.

H6b: There is a positive effect of institutional ownership on e-waste information disclosure of Indonesian firms.

3.3.7 Managerial Ownership and E-Waste Information Disclosure

Managerial ownership refers to the proportion of shares held by executive directors and senior management. Read through a stakeholder lens, managerial shareholding concentrates decision rights in the hands of insiders whose economic interests are tied to the firm's financial performance rather than to the claims of external constituencies. Voluntary environmental disclosure imposes preparation costs, invites regulatory and community scrutiny, and may expose deficiencies in waste-handling practice, while the benefits accrue largely to stakeholders outside the firm. Managers who own a substantial equity stake therefore have both the incentive and the authority to limit such disclosure. Agency theory reaches the same prediction through two distinct routes. The convergence-of-interest argument holds that shareholding aligns managers with owners and reduces the demand for disclosure as a monitoring device (Eng & Mak, 2003). The entrenchment argument holds that significant insider shareholding insulates executives from market discipline and enables them to withhold information likely to attract scrutiny. Both routes, and the stakeholder reading, point in the same direction.

The empirical evidence supports a negative or insignificant association. Eng and Mak (2003) found managerial ownership to be inversely related to voluntary disclosure. Mohd Ghazali (2007) reported comparable Malaysian evidence, showing that companies with higher director ownership disclosed less corporate social responsibility information than firms with more dispersed ownership. Ntim and Soobaroyen (2013) likewise found that ownership concentration constrains voluntary social disclosure. The relationship is particularly salient in Malaysia and Indonesia, where listed firms are characterised by concentrated and frequently family-linked ownership. The costs of e-

waste disclosure are therefore borne by insiders, while its benefits accrue to external stakeholders. This study therefore hypothesises that:

H7a: There is a negative effect of managerial ownership on e-waste information disclosure of Malaysian firms.

H7b: There is a negative effect of managerial ownership on e-waste information disclosure of Indonesian firms.

3.4 Research design

The quantitative strand of the study adopts a secondary data research design, whereas the qualitative strand relies on interview techniques. The target population comprises companies listed on Bursa Malaysia and the Indonesia Stock Exchange (IDX). Sample selection is guided by data availability from Refinitiv Eikon Datastream, a widely used international database for financial and sustainability-related information. Based on an initial screening, approximately 60 companies listed on Bursa Malaysia and 15 companies listed on the IDX were identified as disclosing e-waste-related information in their corporate reports. These firms were therefore selected as the sample for the study. These figures refer to the number of companies identified in each year of the observation window rather than to the total number of observations. Because the number of companies satisfying the screening criterion varies from year to year, the resulting panel is unbalanced. Pooling the four years of data produces the 416 Malaysian and 81 Indonesian firm-year observations analysed in Chapter 4.

In addressing research objectives (a), (b) and (c), the study uses secondary data derived from companies' annual reports, stand-alone sustainability reports and relevant variables obtained from Refinitiv. The period of analysis spans 2021 to 2024. This time frame is significant as it reflects the post-Covid-19 period, during which reliance on electronic devices increased substantially due to the shift towards digital and online activities. That shift in turn contributed to a rise in e-waste generation. The four-year observation window yields approximately 240 firm-year observations for Bursa Malaysia listed companies and about 60 firm-year observations for IDX listed companies. The resulting sample size is considered adequate, as it falls within the range recommended by Roscoe (1975) for behavioural and social science research.

Additionally, this study further incorporates a qualitative interview component to fulfil research objectives (d) and (e). The inclusion of interviews is intended to support and validate the quantitative findings by providing insights into how corporate governance mechanisms operate in practice and influence firms' e-waste management and disclosure decisions. Consistent with mixed-methods research principles, interviews enable researchers to move beyond statistical associations and gain a deeper understanding of the underlying processes and rationales that shape organisational behaviour. Wallwey and Kajfez (2023) highlighted that qualitative interviews play a crucial role in mixed-methods studies by enriching and contextualising quantitative results, thereby enhancing the interpretive depth and credibility of the overall findings. For this purpose, two companies from Malaysia and two from Indonesia were approached for interviews, of which one Malaysian company consented to participate. Prior to the interview session, all sampled companies were approached through formal email invitations to seek their consent to participate. This study ensures that selected respondents are individuals who are directly involved in, or responsible for, sustainability or environmental management within their organisations. An interview protocol consisting of open-ended questions was developed to facilitate in-depth discussion and all interviews were conducted via online meeting platforms.

For data analysis purposes, this study employed SPSS version 27 to generate descriptive statistics for the respondents' demographic profiles and for the variables examined. Hypothesis testing was conducted using the ordinary least squares (OLS) technique in the same software.

3.5 Measurement of variables

The measures used in operationalising the variables of this study are adapted from previously validated instruments in the corporate governance and sustainability disclosure literature. Because the quantitative strand relies on secondary data, all variables are coded from companies' annual reports, stand-alone sustainability reports and Refinitiv Eikon Datastream, rather than elicited through a survey instrument. The operational measure of each variable is discussed next and summarised in Table 3.1.

The qualitative strand is guided by a separate interview protocol comprising open-ended questions, which is attached in Appendix 1.

3.5.1 Dependent variable – E-waste Information Disclosure

The dependent variable of this study is e-waste information disclosure, which is measured using both the extent and the quality of disclosure. The extent of disclosure is measured by the number of sentences related to e-waste information reported in companies' annual and sustainability reports (Abd-Mutalib et al., 2021; Sheikh Abu Bakar et al., 2019a, 2019b). Meanwhile, the quality of disclosure is assessed using a four-point disclosure quality index that reflects varying levels of informational depth, ranging from general narrative disclosure to more comprehensive disclosure incorporating both qualitative and quantitative elements. This measurement approach has been widely adopted in prior sustainability and environmental disclosure studies (Abd-Mutalib et al., 2021; Joseph & Taplin, 2011; Sheikh Abu Bakar et al., 2019a, 2019b). In addition, a thematic analysis is conducted to identify the dominant themes emphasised by companies in relation to their e-waste disclosure practices.

3.5.2 Independent variable – Corporate Governance

Corporate governance is the main independent variable in this study and is operationalised through three dimensions, namely the board of directors, shareholders and the management team. Governance at the board level is measured through several proxies. These are board size, the number of non-executive directors, the presence of a sustainability committee, the frequency of board meetings and board gender diversity. For ownership structure, shareholder influence is measured by the percentage of institutional ownership. Management influence is measured by the percentage of managerial ownership, that is, the percentage of ordinary shares held by executive directors and senior management as reported in the companies' annual reports.

In particular, board size, the number of non-executive directors, the number of members on the sustainability steering committee, the number of women directors and the number of board meetings held during the financial year are all measured using absolute

values. Institutional ownership and managerial ownership are measured as the percentage of ordinary shares held by institutional investors and by executive directors and senior management respectively. These measurements are consistent with prior corporate governance and sustainability studies (Cicchiello et al., 2021; Sheikh Abu Bakar et al., 2019b).

Table 3.1: Summary of Variables Measurements

Variable	Measurement	Sources
Dependent Variable		
E-waste Quantity (EWQT)	Number of e-waste related sentences disclosed in annual and sustainability reports	Abd-Mutalib et al. (2021); Sheikh Abu Bakar et al. (2019a, 2019b)
E-waste Quality (EWQL)	Four-point e-waste disclosure quality index	Abd-Mutalib et al. (2021); Joseph & Taplin (2011)
Independent Variables		
Board Size (BSIZE)	Total number of board of directors	Jizi (2017); Ntim & Soobaroyen (2013)
Non-executive Directors (NED)	Number of non-executive directors	Liao et al. (2015); Haniffa & Cooke (2005)
Sustainability steering committee (SC)	Number of members on the sustainability steering committee	Peters & Romi (2014); Rupley et al. (2012)
Board diversity (BDIV)	Number of women directors	Liao et al. (2015); Cicchiello et al. (2021)
Board meetings (BM)	Number of board meetings held	Laksmana (2008); Giannarakis et al. (2020)
Institutional ownership (IO)	Percentage of institutional ownership	Cormier et al. (2005); Oh et al. (2011)
Managerial Ownership (MO)	Percentage of managerial ownership	Eng & Mak (2003); Mohd Ghazali (2007)
Control Variables		
Firm Size (FSIZE)	Log Total Assets	Haniffa & Cooke (2005)
Industry	1 = telecommunication, technology and finance industries, 0 = Otherwise	Abd-Mutalib et al. (2021)

Moreover, firm size and industry type are included as control variables, as prior studies suggest that these factors influence firms' environmental disclosure behaviour. Firm size is measured using total assets, while industry type is operationalised as a

dummy variable, whereby firms operating in the telecommunication, technology and finance industries are coded as one, and firms in all other industries are coded as zero (Abd-Mutalib et al., 2021; Sheikh Abu Bakar et al., 2019a, 2019b).

3.6 Research model

To examine the effect of corporate governance mechanisms on e-waste disclosure, two separate regression models are developed. The models distinguish between the quantity and quality dimensions of disclosure. Model 1 assesses how governance characteristics influence the extent or volume of e-waste information disclosed. Model 2 evaluates whether corporate governance mechanisms influence the depth, credibility and comprehensiveness of e-waste disclosure.

Model 1: Determinants of E-Waste Disclosure Quantity

$$\mathrm{EWQTY}_{it} = \beta_0 + \beta_1 \mathrm{BSIZE}_{it} + \beta_2 \mathrm{NED}_{it} + \beta_3 \mathrm{SC}_{it} + \beta_4 \mathrm{BDIV}_{it} + \beta_5 \mathrm{BM}_{it} + \beta_6 \mathrm{IO}_{it} + \beta_7 \mathrm{MO}_{it} + \varepsilon_{it} + \beta_8 FSIZE_{it} + \beta_9 IND_{it} + \sum \delta_t Year$$

Where:

EWQTY = E-waste disclosure quantity

BSIZE = Board size

NED = Number of non-executive directors

SC = Sustainability committee

BDIV = Board gender diversity

BM = Board meetings frequency

IO = Institutional ownership

MO = Managerial ownership

FSIZE = Firm size

IND = Industry

β_0 = Constant term

β_1–β_7 = Coefficients of independent variables

ε = Error term

i = Firm

t = Year

δt Year = Year fixed effects

Model 2: Determinants of E-Waste Disclosure Quality

$$\text{EWQLY}_{it} = \beta_0 + \beta_1\text{BSIZE}_{it} + \beta_2\text{NED}_{it} + \beta_3\text{SC}_{it} + \beta_4\text{BDIV}_{it} + \beta_5\text{BM}_{it} + \beta_6\text{IO}_{it} + \beta_7\text{MO}_{it} + \varepsilon_{it} + \beta_8 FSIZE_{it} + \beta_9 IND_{it} + \sum \delta_t Year$$

Where:

EWQLY = E-waste disclosure quality

All other variables remain as previously defined.

These two models allow the study to distinguish between governance factors that drive the amount of disclosure and those that enhance the substantive quality of reporting. Together they provide a more nuanced assessment of corporate e-waste transparency.

CHAPTER 4: RESULTS

4.1 Introduction

This chapter presents the empirical findings of the study and examines the relationship between corporate governance mechanisms and e-waste information disclosure. The study distinguishes two dimensions of disclosure. Quantity refers to the extent or volume of information disclosed, while quality refers to its depth, specificity and credibility. The chapter begins with the descriptive statistics and the disclosure themes. It then reports the regression results on the influence of governance attributes on both dimensions of e-waste disclosure.

4.2 Descriptive statistics

This subsection presents the descriptive statistics for the key variables used in the study. It summarises the level of e-waste information disclosure, in terms of both quantity and quality, across the Malaysian and Indonesian sampled firms. The statistics provide an overview of reporting practice and highlight variations in the extent and depth of the information disclosed. Descriptive measures of the corporate governance mechanisms are also reported.

4.2.1 Descriptive statistics – Malaysia

Table 4.1 presents the descriptive statistics on e-waste disclosure and corporate governance mechanisms for 416 Malaysian firm-year observations. The number of e-waste sentences ranges from zero to 22, with a mean of 2.97 and a standard deviation of 4.45. On average, therefore, Malaysian companies disclose only a few sentences on e-waste in their annual or sustainability reports. The wide range between the minimum and maximum values indicates an uneven landscape of disclosure practice. Some firms provide fairly detailed reporting, while at least one firm does not mention e-waste at

all. This inconsistency suggests that no common or standardised approach to e-waste reporting exists in Malaysia. The pattern reflects differences in firms' awareness, resources and commitment towards environmental management, particularly on e-waste. A small number of companies have begun to integrate e-waste issues into their reporting, whereas many others remain silent or offer only general statements without specific detail. This finding is consistent with prior Malaysian studies (Ab-Aziz et al., 2023; Abd-Mutalib et al., 2021; Nik Azman & Mohd Salleh, 2020), which also report that e-waste and other waste-related disclosures remain limited and vary widely across sectors. Although Malaysian telecommunications and technology firms are expected to report e-waste information, the absence of a clear regulatory requirement leaves firms with full discretion over whether and how to disclose. That discretion helps explain the observed differences in reporting quantity.

Table 4.1: Descriptive Statistics – Malaysia

	Minimum	Maximum	Mean	Std. Deviation
EWQTY	0	22	2.97	4.45
EWQLY	0	3	1.13	1.226
BSIZE	5	15	8.55	2.044
NED	1	8	2.88	1.372
SC	0	10	3.62	1.211
BDIV	0	8	2.42	1.036
BM	1	28	6.99	3.539
IO	0.000	65.871	6.4519	9.244
MO	0.000	70.97	8.1764	14.219
FSIZE	0.000	1,073,649,797	40,051,426	134,553,553
IND	0	1	0.34	0.473

Notes:
N=416
EWQTY = E-waste disclosure quantity; BSIZE = Board size; NED = Number of non-executive directors; SC = Sustainability committee; BDIV = Board gender diversity; BM = Board meetings frequency; IO = Institutional ownership; MO = Managerial ownership; FSIZE = Firm size; IND = Industry

In terms of corporate governance mechanisms, board size (BSIZE) ranges from five to 15 members, with a mean of 8.55. This aligns with prior research (Abd-Mutalib et al., 2021; Sheikh Abu Bakar et al., 2019a). The 2021 Malaysian Code on Corporate Governance (MCCG 2021) does not mandate a fixed number of board members but emphasises that board composition should be suitable for the company's size and complexity. Thus, this average board size represents a common governance practice in Malaysia and is consistent with the size observed in most PLCs. The mean number of

non-executive directors (NED) is 2.88, ranging from one to eight. Measured against the mean board size of 8.55, non-executive directors account for roughly one-third of the average board. Because the variable captures non-executive status rather than independence as defined by MCCG 2021, it is treated here as an indicator of the size of the monitoring group on the board rather than as a measure of board independence. A monitoring group of about three directors on a board of nine indicates that executive voices remain numerically dominant in Malaysian boardrooms, which matters for voluntary environmental reporting because e-waste disclosure competes for board attention with operational priorities. This reading is consistent with the regression result, where NED is not significantly related to either the quantity or the quality of e-waste disclosure, suggesting that the number of non-executive directors matters less than whether those directors hold sustainability expertise and real influence over reporting decisions.

Turning to gender diversity, the average number of women directors (BDIV) is 2.42, which indicates that most firms have one or two women on their board. This is consistent with the Bursa Malaysia listing requirement, effective from 2022, that at least one female director be appointed, and with the national policy target of 30% female representation. The minimum value of zero and the maximum of eight nevertheless show that at least one company appointed no female director. For board meetings, the number held ranges from one to 28, with a mean of 6.99 per year. This is consistent with typical Malaysian practice, where listed companies meet at least five times a year, usually once each quarter, to ensure proper oversight. Boards therefore appear to meet actively, although it is the content of their discussions, particularly on sustainability, that ultimately determines the effect on disclosure.

The number of members serving on the sustainability steering committee (SC) records a mean of 3.62, or approximately four members, with a range between zero and 10. Many companies have therefore established such committees, consistent with Bursa Malaysia's Sustainability Reporting Guide, which encourages firms to establish or integrate sustainability functions within board structures. Institutional ownership (IO) averages 6.45%, ranging from zero to 65.87%, while managerial ownership averages 8.18%, ranging from zero to 70.97%. These figures reflect Malaysia's concentrated

ownership structure, in which ownership and control frequently rest with key individuals or families.

4.2.2 Descriptive statistics - Indonesia

Table 4.2 presents the descriptive statistics for 81 Indonesian firm-year observations and shows considerable variation in e-waste disclosure and governance practice. The number of e-waste sentences ranges from zero to 25, with a mean of 2.01. On average, therefore, firms provide limited information on e-waste, and several make no mention of it at all. The high maximum value indicates that a small number of firms disclose extensively, most probably larger or export-oriented companies with greater sustainability visibility. The wide range nevertheless reflects uneven adoption of environmental reporting. Some firms are making progress, while many still treat e-waste as a minor or irrelevant issue in their sustainability communication.

Table 4.2: Descriptive Statistics – Indonesia

	Minimum	Maximum	Mean	Std. Deviation
EWQTY	0	25	2.01	5.137
EWQLY	0	3	1.025	1.296
BSIZE	4	12	7.9	2.137
NED	0	3	1.41	1.07
SC	0	4	2.84	0.887
BDIV	0	4	1.88	0.927
BM	0	54	7.94	9.595
IO	0	9.97	3.309	2.420
MO	0	6.74	0.64	1.6153
FSIZE*	7,063	1,440,000	199,640	347,821
IND	0	1	0.41	0.494

Notes:
N = 81
EWQTY = E-waste disclosure quantity; BSIZE = Board size; NED = Number of non-executive directors; SC = Sustainability committee; BDIV = Board gender diversity; BM = Board meetings frequency; IO = Institutional ownership; MO = Managerial ownership; FSIZE = Firm size; IND = Industry; * = Rupiah ‘000,000

Board size (BSIZE) ranges from four to 12 members, with a mean of 7.90. This range is consistent with OJK Regulation No. 33/POJK.04/2014, which does not fix the number of directors but requires the board of directors of an issuer or public company

to consist of at least two members. All sampled firms comply with this requirement, as the reported minimum exceeds two members. Indonesian listed companies therefore exhibit high compliance with national regulation. The mean also reflects common practice in Indonesian listed firms, which typically maintain between six and nine directors for effective deliberation.

The number of non-executive directors (NED) ranges from zero to three, with a mean of 1.41. Measured against the mean board size of 7.90, NED account for approximately 18% of the average board. Because NED is recorded as a count rather than as a firm-level proportion, and because the minimum value is zero, these figures do not establish whether individual firms satisfy the OJK requirement that independent commissioners comprise at least 30% of the board of commissioners. Many boards nevertheless remain dominated by executive or family members. The limited variation also implies that the independence of non-executive directors may be more procedural than substantive. The sustainability steering committee (SC) variable ranges from zero to four, with a mean of 2.84. Some firms have therefore established formal sustainability oversight bodies, but the proportion remains small and many committees serve administrative rather than strategic roles. It is worth noting that an environmental, social and governance committee under the Board of Commissioners became effectively mandatory for listed companies and financial institutions only from 2025, which is after the sampling period. The low number of committees may therefore reflect the absence of an OJK mandate at the time.

In terms of gender diversity (BDIV), the number of women directors ranges from zero to four, with a mean of 1.88. Women's participation on boards therefore remains limited, even though OJK and IDX continue to promote diversity through their governance guidelines. Unlike Malaysia and several other countries, which set targets of 30 to 40% female representation, Indonesian law does not impose gender-based quotas (Law No. 40 of 2007 on Limited Liability Companies). Some Indonesian listed companies also remain reluctant to appoint any women directors. This limited representation may restrict the influence of gender diversity on strategic and sustainability-related discussions.

The number of board meetings (BM) ranges from zero to 54 a year, with a mean of 7.94. At least one company reported no board meeting for the year, while the highest count was 54, recorded by a large commercial bank whose board meets almost weekly, in line with the closer supervision applied to financial institutions in Indonesia. A zero count reflects non-disclosure of board meeting frequency rather than a board that never met. The firm concerned disclosed only its annual general meeting. The annual general meeting is a meeting of shareholders, not of the Board of Commissioners, so it is not counted under the BM variable. The board meeting figure for that firm was therefore coded as zero in the absence of any reported count. A board that genuinely never met would depart from OJK Regulation No. 33/POJK.04/2014, which requires the Board of Commissioners to meet at least once every two months to review financial performance and strategic issues. The mean frequency reflects broad compliance with governance expectations. However, because sustainability is not always a fixed agenda item, frequent meetings may not automatically translate into more environmental disclosure.

Institutional ownership (IO) ranges from zero to 9.97%, with a mean of 3.31%. Some firms therefore attract institutional investors, while many remain dominated by family or concentrated ownership. Institutional holdings in Indonesian listed companies have nevertheless been increasing in recent years. Managerial ownership (MO) is very low, ranging from zero to 6.74% with a mean of 0.64%, which is consistent with prior Indonesian governance studies (Permatasari et al., 2025). Most managers therefore hold little or no equity in their companies. Although many firms are family-controlled, family shareholdings are usually held indirectly through holding companies or affiliated entities and are not recorded as managerial ownership under OJK and IDX disclosure definitions. The reported figures therefore capture only the shares registered in the names of individual directors. Institutional ownership appears higher because institutional investors report their stakes directly. Low managerial ownership thus reflects Indonesia's ownership reporting structure, in which control is exercised indirectly, rather than a weak family presence.

Turning to the control variables, firm size (FSIZE) varies widely, from firms with assets below IDR 7 billion to conglomerates exceeding IDR 1 trillion. The large standard deviation indicates substantial variation, consistent with the mixed

composition of Indonesia's capital market. The industry variable records a mean of 0.41, which indicates that 41% of the sampled firms operate in sectors such as manufacturing, electronics and telecommunications. These sectors face greater environmental scrutiny and regulatory attention. Nearly four in ten listed firms are therefore subject to direct environmental expectations, which may help explain the observed differences in disclosure behaviour.

4.3 Themes of E-Waste Information Disclosure

The second objective of this study is to compare the themes of e-waste information disclosure in both countries. The results are shown in Tables 4.3 and 4.4.

Table 4.3: Themes of E-Waste Information Disclosure – Malaysia

Themes	Malaysia (N = 416)	% of firms
Recycling	132	31.7
Proper Disposal	90	21.6
Adherence and Protocols	70	16.8
Reporting	47	11.3
Collection and Donation	44	10.6
Awareness	43	10.3
Reducing	20	4.8
Collaboration	17	4.1
Reusing	16	3.8
Recovery	11	2.6
Innovation	6	1.4
Resold	3	0.7
Storage	2	0.5
Award	1	0.2

Table 4.3 shows how the 416 Malaysian firm-year observations spread their e-waste disclosure across fourteen themes. Recycling is the most common theme, appearing in 132 firms (31.7%). Proper disposal follows with 90 firms (21.6%), then adherence and protocols with 70 firms (16.8%). All three themes deal with what happens to equipment after it is discarded. Together they show that Malaysian firms report mainly on the handling of e-waste at the end of its life. This matches the national policy setting, where e-waste is treated as scheduled waste and firms are expected to channel it to licensed recovery facilities (Department of Environment Malaysia, 2023).

Yun et al. (2019) also report that recycling and recovery operations dominate e-waste management practice in Malaysia.

Themes that deal with preventing waste are far less common. Reducing appears in only 20 firms (4.8%) and reusing in 16 firms (3.8%). Innovation (six firms, 1.4%), resale (three firms, 0.7%), storage (two firms, 0.5%) and awards (one firm, 0.2%) are rare. Reporting appears in 47 firms (11.3%), while collection and donation programmes appear in 44 firms (10.6%) and awareness activities in 43 firms (10.3%). The pattern suggests that firms treat e-waste as a disposal problem rather than a design or procurement problem. It also suggests that disclosure follows what firms already do operationally, rather than what would reduce e-waste at source. This is consistent with earlier Malaysian evidence that environmental disclosure remains narrow and descriptive (Abd-Mutalib et al., 2021; Ab-Aziz et al., 2023).

Table 4.4 shows a different picture for the 81 Indonesian firm-year observations. Reporting is by far the most common theme, appearing in 21 firms (25.9%). Recycling is a distant second with six firms (7.4%), followed by adherence and protocols with five firms (6.2%). Reusing and recovery each appear in three firms (3.7%), proper disposal in two firms (2.5%), and reducing, awareness and collaboration in one firm each (1.2%). Five themes, namely storage, collection and donation, resale, innovation and awards, do not appear at all.

Table 4.4: Themes of E-Waste Information Disclosure – Indonesia

Themes	Indonesia (N = 81)	% of firms
Reporting	21	25.9
Recycling	6	7.4
Reusing	3	3.7
Reducing	1	1.2
Storage	0	0.0
Recovery	3	3.7
Collection and Donation	0	0.0
Resold	0	0.0
Proper Disposal	2	2.5
Adherence and Protocols	5	6.2
Awareness	1	1.2
Innovation	0	0.0
Collaboration	1	1.2
Award	0	0.0

The dominance of the reporting theme suggests that Indonesian firms mention e-waste mainly as part of meeting sustainability reporting obligations, rather than to describe what they actually do. OJK Regulation No. 51/POJK.03/2017 requires listed issuers and financial institutions to publish a sustainability report, which gives firms a reason to mention waste even where no specific programme exists (Otoritas Jasa Keuangan, 2017). Comparing the two countries, Malaysian firms report across a wider set of themes and concentrate on operational handling, while Indonesian firms concentrate on the act of reporting itself. Neither country pays much attention to reducing or reusing, which sit at the top of the waste hierarchy. This suggests that firms in both countries are still at an early stage of e-waste management, focusing on downstream handling instead of prevention (Baldé et al., 2017).

4.4 The Effect of Corporate Governance Mechanisms on E-waste Disclosure

This subsection reports the regression results on the relationship between corporate governance mechanisms and e-waste disclosure. Two models are estimated to capture the two dimensions of disclosure. Model 1 examines the effect of corporate governance mechanisms on disclosure quantity, that is, the extent or volume of information disclosed. Model 2 examines their effect on disclosure quality, that is, the comprehensiveness, specificity and credibility of the information disclosed.

The use of two models allows the analysis to distinguish between the volume of disclosure and the substantive quality of reporting. It therefore provides a more nuanced understanding of how governance attributes influence corporate e-waste reporting practice.

4.4.1 Malaysian results

The multiple regression results in Table 4.5 explain 8.2% of the variance in e-waste disclosure quantity ($R2 = 0.082$, $F = 4.007$, $p < 0.001$). The explanatory power of the model is modest, which is typical of disclosure studies in voluntary reporting

settings. The low R2 indicates that structural governance variables account for only part of the variation in disclosure quantity. Other factors, such as management awareness, industry visibility and external stakeholder expectations, are likely to play a larger role. This implies that policy and institutional support, such as enhanced Bursa Malaysia sustainability reporting guidelines or sector-specific e-waste disclosure frameworks, could strengthen the consistency and quality of environmental reporting.

Table 4.5 reports that board size (BSIZE) has a negative and significant relationship with e-waste disclosure quantity (b = -0.162, p = 0.003) and quality (b = -0.140, p = 0.012). Firms with larger boards therefore disclose less e-waste information and appear to concentrate more on financial performance. Larger boards may also face coordination difficulties, slower decision-making and greater difficulty in focusing on specific environmental topics. Stakeholder theory expects a larger board to represent a wider range of stakeholder interests.

Table 4.5: Regression Analysis for Malaysian Public Listed Companies

	Model			
	1			2
	Coef.	*t-value*	Coef.	*t-value*
(Constant)		1.344		1.642
BSIZE	-0.162	-2.941***	-0.140	-2.524**
NED	-0.015	-0.298	-0.019	-.356
SC	0.088	1.719*	0.090	1.746*
BDIV	0.11	2.067**	0.120	2.240**
BM	-0.046	-0.867	-0.018	-0.342
IO	0.058	1.103	0.082	1.546
MO	0.118	2.31**	0.109	2.113**
FSIZE	0.076	1.493	0.003	0.065
IND	0.211	4.193***	0.199	3.928***
R^2	0.082		0.071	
Adj R^2	0.061		0.050	
F-Value	4.007		3.424	
Significance	<0.001		<0.001	
Year	Yes		Yes	

****, **, * refer to significant levels at 1%, 5% and 10%*
Refer to Table 3.1 for variable definitions.
N = 416

In practice, however, a larger board finds it harder to agree on which claims deserve attention and to act on them. Environmental claims such as e-waste are then crowded out by claims that are financially more immediate. Malaysian evidence on e-waste has likewise reported mixed board size effects (Abd-Mutalib et al., 2021). The result supports the view that efficiency and accountability may decline once board membership expands beyond a manageable level. Board effectiveness, rather than board size alone, is therefore crucial in promoting sustainability communication. The number of non-executive directors (NED) does not significantly influence either disclosure quantity or quality. Although MCCG 2021 emphasises independent oversight, the presence of non-executive directors alone does not appear to ensure proactive sustainability engagement. Stakeholder theory positions non-executive directors as the board members least tied to management and therefore the most able to press claims from outside the firm. The result suggests that this role is not yet being played in Malaysia. Non-executive directors appear to remain focused on financial performance and compliance rather than on environmental claims, which limits their influence on disclosure.

The sustainability steering committee (SC) has a positive but marginally significant effect on disclosure quantity ($b = 0.088$, $p = 0.086$) and quality ($b = 0.090$, $p = 0.081$). Firms with stronger sustainability committees therefore disclose more detailed e-waste information, although the relationship is not yet robust across all companies. Stakeholder theory treats such a committee as the formal channel through which stakeholder concerns reach the board, and the positive coefficient suggests that this channel is beginning to function. The finding also supports Bursa Malaysia's emphasis on embedding sustainability oversight within board structures. In many firms, however, the committee's authority and its integration into decision-making remain limited, which may weaken its effect on disclosure. A further explanation is that the committee was formally emphasised only in MCCG 2021 and was therefore relatively new to the sampled firms.

The relationship between women directors (BDIV) and e-waste disclosure is positive and significant for both quantity ($b = 0.110$, $p = 0.039$) and quality ($b = 0.120$, $p = 0.026$). This is consistent with stakeholder theory, which holds that a board reflecting a wider range of backgrounds is better able to recognise the claims of groups

beyond shareholders. Prior studies report the same pattern, finding that women directors raise board sensitivity to ethical and environmental concerns (Liao et al., 2015; Ben-Amar et al., 2017; Cicchiello et al., 2021). Female participation therefore appears to enhance the quality of board deliberation, which in turn encourages fuller disclosure and stronger stakeholder engagement. The finding supports continued efforts to place and empower women directors at the decision-making level, and reinforces the relevance of gender-inclusive boards to corporate transparency. Board meetings (BM), by contrast, are not significantly associated with either disclosure quantity or quality. Although listed companies commonly hold at least five meetings a year, frequency alone may not drive better sustainability outcomes. Read through stakeholder theory, what matters is not how often a board meets but whether stakeholder claims actually reach its agenda. Meeting frequency alone does not indicate that e-waste is being discussed, which is why the content of board discussion matters more than the number of meetings.

Turning to ownership structure, institutional ownership (IO) has no significant effect in either model. Stakeholder theory distinguishes stakeholders by the salience of their claims to managers. Institutional investors in Malaysia hold power, but their claims remain largely financial, so managers face little pressure from them on environmental reporting. This may also reflect that Malaysian institutional investors are still developing their ESG focus relative to counterparts in developed markets. The result therefore suggests that institutional investors in Malaysia do not yet exert strong pressure for detailed sustainability reporting. It may further reflect the small number of Malaysian listed firms with high institutional ownership, which are mainly government-linked companies. Managerial ownership (MO), by contrast, is positively and significantly related to disclosure quantity ($b = 0.118$, $p = 0.021$) and quality ($b = 0.109$, $p = 0.035$). This is the opposite of the negative relationship predicted by H7a, and that hypothesis is therefore rejected. The positive coefficient supports the view that managers who hold ownership stakes are more invested in long-term reputation and corporate accountability. The result is consistent with stakeholder theory, as managers who hold equity bear the long-term consequences of stakeholder dissatisfaction and therefore have a stronger incentive to communicate openly on environmental matters.

Among the control variables, industry is positive and significant (b = 0.211, p < 0.001), which indicates that companies in environmentally sensitive or high-visibility sectors disclose more e-waste information. Under stakeholder theory, firms in these sectors face more urgent and more visible stakeholder claims, and disclosure is one means of responding to them. Firm size (FSIZE) is positive but not significant (b = 0.076, p = 0.136). Larger firms may therefore command more resources for disclosure, but this does not necessarily translate into higher levels of reporting.

In summary, the findings indicate that Malaysian firms are moving towards greater environmental transparency. Further improvement depends on translating formal governance structures into active board engagement, stronger sustainability committee functions and more inclusive leadership.

4.4.2 Indonesian results

The regression results in Table 4.6 explain 25.9% of the variation in e-waste disclosure quantity (R2 = 0.259, adjusted R2 = 0.166, F = 2.764, p = 0.008). Corporate governance variables therefore exert a moderate influence on disclosure practice among Indonesian listed companies. Although this exceeds the corresponding Malaysian figure of 8.2% (adjusted R2 = 0.061), it remains relatively low. Governance mechanisms alone therefore do not fully explain e-waste disclosure behaviour, and other contextual factors, such as management awareness, industry visibility and external stakeholder expectations, are likely to play a stronger role.

Table 4.6 shows that several findings differ between Model 1 and Model 2. Board size (BSIZE) has a negative and significant relationship with disclosure quantity (b = -0.334, p = 0.040), but no significant effect on disclosure quality. Firms with larger boards therefore disclose less e-waste information. Larger boards may face coordination difficulties, diluted responsibility and slower decision-making, all of which can hinder focused discussion of emerging sustainability issues. OJK Regulation No. 33/POJK.04/2014 requires board composition to be appropriate to the complexity of the company, yet in practice an excessively large board can become symbolic rather than strategic. This result mirrors the Malaysian finding and earlier regional evidence

(Abd-Mutalib et al., 2021). Read through stakeholder theory, a large board widens the range of interests represented but slows the board's ability to convert stakeholder claims into disclosure. Board effectiveness therefore matters more than board size.

Table 4.6: Regression Analysis for Indonesian Public Listed Companies

	Model			
	1		2	
	Coef.	*t*-value	Coef.	*t*-value
(Constant)		0.485		0.704
BSIZE	-0.334	-2.093**	-0.230	-1.361
NED	-0.009	-0.064	0.061	0.412
SC	0.241	1.784*	0.119	1.832*
BDIV	-0.183	-1.14	-0.317	-1.867*
BM	-0.072	-0.544	0.390	2.783***
IO	0.182	1.656	-0.054	-0.461
MO	-0.021	-0.192	0.103	0.872
FSIZE	-0.018	-0.099	0.154	0.794
Industry	0.484	3.377***	0.031	0.201
R^2	0.259		0.329	
Adj R^2	0.166		0.244	
F-Value	2.764		3.870	
Significance	<0.001		<0.001	
Year	Yes		Yes	

****, **, * refer to significant levels at 1%, 5% and 10%*
Refer to Table 3.1 for variable definitions.
N = 81

The number of non-executive directors (NED) is not significantly related to either disclosure quantity or quality. Although OJK requires at least 30% of commissioners to be independent, independence on Indonesian boards is often formal rather than functional. Many independent directors are appointed to satisfy regulatory requirements but may lack sustainability expertise or sufficient influence over disclosure decisions. Stakeholder theory expects independent commissioners to carry external claims into the boardroom. Where independence is formal rather than functional, that channel remains closed. Their presence may therefore strengthen compliance reporting without driving voluntary disclosure such as detailed e-waste information.

The sustainability steering committee (SC) is positively and marginally significantly associated with both disclosure quantity (b = 0.241, p = 0.079) and quality (b = 0.119, p = 0.086). Firms with such a committee are therefore more likely to report e-waste information and to report it in greater depth. Although these committees were not yet mandatory during the sampling period, the finding suggests that where a formal channel for stakeholder concerns exists, more e-waste information reaches the report. This reflects the growing recognition of sustainability oversight within governance structures. The marginal significance also implies that many committees are still evolving, with limited authority or resources to influence the depth of disclosure.

Board gender diversity (BDIV) has a negative but insignificant relationship with disclosure quantity (b = -0.183, p = 0.258), and a negative and significant relationship with disclosure quality (b = -0.317, p = 0.066). Although women's board representation is improving slowly, gender diversity in Indonesia remains low and largely symbolic, as no legal quota exists (Law No. 40 of 2007 on Limited Liability Companies). Stakeholder theory expects diverse boards to be more responsive to external claims, but responsiveness depends on whether those directors hold real authority. Where e-waste reporting is voluntary and weakly regulated, women directors may instead discourage overstated or non-substantive disclosure. The result may also reflect that women directors often hold non-executive or advisory roles, with limited authority over strategic areas such as sustainability reporting. This contrasts with Malaysia, where gender diversity exerts a positive influence supported by stronger policy interventions, notably the 30% target and the Bursa Malaysia inclusion rule.

Board meetings (BM) are not significantly related to disclosure quantity, but they have a positive and significant effect on disclosure quality (b = 0.390, p = 0.007). Active boards therefore appear to strengthen the credibility and substance of environmental reporting. Frequent meetings are likely to improve information exchange, oversight and monitoring intensity, which in turn enhance the accuracy and depth of disclosure. Indonesian boards meet regularly in line with the IDX Governance Guidelines (2019). The insignificant association with disclosure quantity suggests that board diligence favours substantive reporting over symbolic breadth. This is consistent with stakeholder theory, under which boards that meet more often are better able to

process stakeholder concerns and therefore report more credibly, even if they do not report at greater length.

Turning to ownership structure, institutional ownership (IO) has no significant effect in either model. Although institutional investors are gradually expanding their holdings in Indonesian listed companies, they have not yet become strong advocates of ESG transparency. One plausible explanation is that most domestic institutions, such as pension and insurance funds, continue to prioritise financial returns over sustainability performance. In stakeholder terms, these investors hold power but their claims lack environmental urgency. Their ownership therefore does not yet translate into active monitoring or pressure for detailed e-waste disclosure.

Managerial ownership (MO) is likewise insignificant for both disclosure quantity and quality. This may be attributed to the low level of managerial ownership reported in the descriptive results. Indonesia has a distinctive ownership structure that is dominated by families. Although many managers are family members, their shares are typically held indirectly through holding companies and are therefore not recorded as managerial ownership in OJK and IDX reports. The small reported percentages thus reflect the ownership reporting structure rather than a weak family presence, as control is exercised indirectly. Managerial ownership in Indonesia therefore represents extended family control rather than a personal stake that ties managers to long-term stakeholder outcomes, which helps to explain its insignificant effect on disclosure.

Among the control variables, firm size (FSIZE) has no significant effect on either disclosure quantity or quality. Larger firms therefore do not necessarily provide more detailed e-waste disclosure. Although large firms command greater resources and visibility, many concentrate on broader sustainability topics such as energy or carbon rather than on specific waste categories. Industry type, by contrast, has a strong positive and significant relationship with e-waste disclosure ($b = 0.484$, $p < 0.001$). As in Malaysia, firms in environmentally sensitive sectors such as electronics, telecommunications and manufacturing report more e-waste information. This is consistent with stakeholder theory, under which firms in high-impact industries face more salient stakeholder claims and disclose environmental information to maintain

trust and manage reputational risk. Industry visibility therefore acts as the primary external driver of disclosure in Indonesia's voluntary reporting environment.

Tables 4.7 and 4.8 summarise the outcome of each hypothesis for Malaysia and Indonesia respectively. Of the fourteen hypotheses tested, three are supported, one is partially supported and ten are not supported. Two results are significant in the direction opposite to that predicted. Board size is negatively related to disclosure in both countries, contrary to H1a and H1b, and managerial ownership is positively related to disclosure in Malaysia, contrary to H7a.

Table 4.7: Summary of Hypothesis Testing Results – Malaysia

Hypothesis	**Predicted sign**	**Model 1 (quantity)**	**Model 2 (quality)**	**Conclusion**
H1a Board size	+	-0.162***	-0.140**	Not supported (significant negative)
H2a Board independence	+	-0.015	-0.019	Not supported
H3a Board meetings	+	-0.046	-0.018	Not supported
H4a Board gender diversity	+	0.110**	0.120**	Supported
H5a Sustainability steering committee	+	0.088*	0.090*	Supported
H6a Institutional ownership	+	0.058	0.082	Not supported
H7a Managerial ownership	-	0.118**	0.109**	Not supported (significant positive)

Notes: ***, ** and * denote significance at the 1%, 5% and 10% levels respectively. ns = not significant. Coefficients are standardised. Refer to Table 4.5 for the full regression output.

Table 4.8: Summary of Hypothesis Testing Results – Indonesia

Hypothesis	Predicted sign	Model 1 (quantity)	Model 2 (quality)	Conclusion
H1b Board size	+	-0.334**	-0.230	Not supported (significant negative)
H2b Board independence	+	-0.009	0.061	Not supported
H3b Board meetings	+	-0.072	0.390***	Partially supported (quality only)
H4b Board gender diversity	+	-0.183	-0.317*	Not supported (significant negative)
H5b Sustainability steering committee	+	0.241*	0.119*	Supported
H6b Institutional ownership	+	0.182	-0.054	Not supported
H7b Managerial ownership	-	-0.021	0.103	Not supported

Notes: ***, ** and * denote significance at the 1%, 5% and 10% levels respectively. ns = not significant. Coefficients are standardised. Refer to Table 4.6 for the full regression output.

4.5 Interview

This section reports the qualitative findings that address the fourth and fifth objectives of the study. The interview was conducted online with the Head of the Sustainability Department of a Malaysian public-listed telecommunications company and lasted about one hour. Two Malaysian and two Indonesian companies were invited to take part, but only this company agreed, so the qualitative findings describe the Malaysian setting only (see Sections 3.4 and 5.4). With the respondent's permission, the session was audio recorded and transcribed in full. The transcript was read several times, coded line by line, and the codes were grouped into the themes reported in this section. Four open-ended questions were put to the respondent, covering the company's e-waste activities, the role of corporate governance, the role of ownership structure and

the other factors that support e-waste management. The findings are presented under each question in turn and are read alongside the regression results reported in Section 4.4.1.

4.5.1 E-waste activities and practices

The respondent was first asked to describe the e-waste activities and practices of her company. She began with the definition. The company applies the definition of e-waste issued by the Department of Environment but goes beyond it in practice (Department of Environment Malaysia, 2023). Any item that is potentially as toxic as e-waste, such as batteries, is treated as electronic waste. She showed a clear understanding of the consequences of poor handling, stating that electronic waste should "never be sent to landfill" and should not be placed in municipal bins, and she linked improper disposal to long-term soil contamination. This understanding is stronger than the general public awareness reported in earlier Malaysian studies (Mohd Yahya et al., 2022; Mohamad et al., 2022).

> *"We know that electronic waste should, number one, never be ... sent to landfill, right? It should not be actually thrown in our regular trash bins that are collected by our municipal councils ... we are well aware of the actual environmental implications of e-waste and we actually take that very seriously in our practice."*

Practice begins with a waste inventory. The respondent explained that the first step for any company is to understand its own waste profile, that is, what the waste is and where it comes from. She started building this inventory when she joined the company and reported that coverage of waste reporting had reached about 90%. The inventory tracks each waste stream from the point of generation to its final destination, whether incineration, landfill, recycling or refurbishment. The largest source of e-waste is network operations, mainly the maintenance of transmission towers. This waste is recorded and reported to the Department of Environment through its official portal, and it is passed to recyclers licensed by the Department. At the time of the interview, about 84% of network e-waste was recycled. For office equipment, the company no longer

buys or owns its devices. Laptops, monitors and other hardware are leased, so they return to the owner for reuse, refurbishment or recycling, which the respondent reported had reduced information technology waste to almost zero.

> *"The first thing … for any company when it comes to sustainability is making sure you actually have a waste inventory, which is understanding what is a waste profile? Where does the waste come from? … At this time, our network electronic waste recycling is at … 84 percent, which means only about 16% is unable to be recycle."*

Practice also extends outside the company. Internally, standard operating procedures and internal audits produce what the respondent described as high compliance. Externally, the company has run national collection programmes. Members of the public could request a free collection of a minimum of three unused items through a website or an application, or drop items at any post office, and they received a monetary value for the items returned. She argued that campaigns alone do not change behaviour, and that what makes a difference is convenience together with the return of value: giving people "the monetary value for their items" builds an understanding that e-waste is worth something. The company has also collaborated with a state government and with community centres under the national communications regulator.

> *"What actually drives awareness? … It's not just doing, you know, advertisements, communications and just campaign, no. The one that really makes [a] difference for human behaviour is them understanding the value and getting the value back for what they are recycling."*

4.5.2 The role of corporate governance

The second question asked whether corporate governance strengthens e-waste management practice, and if so how. The respondent answered that it does, and she pointed to three governance features. The first is management commitment. She reported that three members of the C-suite, including the chief executive, are strong

supporters of responsible e-waste management and speak about it across the company, and she stated plainly that without that support the company would not be where it is today. The second is the sustainability committee. The company has one, and she stressed that it works only because its members are drawn from senior management rather than from sustainability staff alone. A committee made up of departmental heads without decision-making authority, in her view, would not succeed. The third is assurance. An internal audit team reviews waste practices and reports directly to the board audit committee rather than to the chief executive, which she said raises accountability for waste practice across the business. External assurance of certain sustainability data will also be required from the 2027 reporting year.

> *"The sustainability committee consists of most of the key management at C-suite level … to make it successful, you need to have management [involved]. You cannot just be a group of different heads … it needs to be from management … They report directly to the board audit [committee]. Yeah, so more senior than the CEO."*

> *"I actually have 3 strong members [of] management of the C-suite including the CEO, 3 of them, who are very strong proponents of responsible e-waste management and recycling. And they speak about it company wide … without that kind of level of support, we would not be where we are today."*

The respondent also supported the expectation set out in Section 3.3.4 on board diversity. She said she sees a clear link between greater board diversity and stronger sustainability practice, and she extended the point beyond gender. In her experience, a board that combines local and international directors produces the discussion that forces a position to be taken on environmental matters. Without differing perspectives, she suggested, such issues may never reach the board agenda at all. These accounts support the positive and significant coefficients on board gender diversity and the sustainability steering committee reported in Table 4.5. They also reinforce the point made in Section 4.4.1 that what matters is whether stakeholder concerns actually reach the board agenda, rather than the formal existence of a governance structure.

"I definitely see a correlation between increase board diversity, to increase or enhance sustainability practices. Yes, in terms of gender, but I also notice in our experience … it could be from the same gender but from different countries, different backgrounds … if they are not both having different perspectives, whether it's Malaysian or global perspectives, it doesn't even create a forum to discuss these things at board level."

4.5.3 The role of ownership structure

The third question asked whether ownership structure strengthens e-waste management practice. Here the answer was largely negative. The respondent reported that investors do ask about compliance and carbon targets, but only once a year and by email from investment analysts. At general meetings, she said, not a single question concerns sustainability; the questions are about shareholder value and dividends. She expected investor pressure to build over time, and observed that it had grown over the past decade, but judged that it has not yet reached a level that compels management to act. Pressure from other external parties was also absent. She stated that there is no pressure from customers or suppliers, and that pressure on suppliers flows in the opposite direction, from her company outwards, as part of its effort to raise standards in its own supply chain.

"Investors do ask questions like, 'Do you comply with the laws?' 'Do you have carbon targets?' … But … when you attend [the] AGM of … public listed companies, not a single question about sustainability – it's about shareholder value, it's about dividends … Now, any other pressures in terms of waste? No … The pressure to our suppliers come[s] from us."

This account is consistent with the quantitative results. Institutional ownership had no significant effect on either e-waste disclosure quantity or quality in the Malaysian sample, as reported in Table 4.5. Read through stakeholder theory,

institutional investors hold considerable power over the firm, but their claims remain financial rather than environmental, so managers face little pressure from that quarter on e-waste reporting. This is consistent with Malaysian evidence that stakeholder power is unevenly translated into environmental disclosure (Hamzah & Abdullah, 2018). It should be noted, however, that the respondent addressed ownership mainly in terms of investor pressure. She did not comment directly on managerial shareholding, so the interview does not speak to the positive managerial ownership coefficient reported in Table 4.5.

4.5.4 Other contributing factors

The final question asked what other factors contribute to enhanced e-waste management. The respondent named regulation as the strongest factor, and placed it ahead of everything else. Because scheduled waste must be reported to the Department of Environment, she was able to approach other divisions on the ground that the company was not compliant, which quickly produced internal processes and tools. In her words, the easiest way to move internal stakeholders is to be able to point to a rule in law. Taken with the management commitment described in Section 4.5.2, the two factors she identified as decisive were regulation and senior management support.

> *"The first one, and always when it comes to sustainability, is the regulation ... which means if there's a rule by law, then you have to manage your waste responsibly ... I was able to use that to approach all the different divisions and say, 'Hey, do you know ... we are non-compliance because we are not reporting this?'"*

4.5.5 Obstacles in performing e-waste practices

The respondent also raised two obstacles that shape what a company can achieve. The first is the light regulation of e-waste recyclers. Recyclers hold a licence from the Department of Environment, but she said there is no further oversight of what happens inside a recycling plant. When her company asked recyclers to report what proportion

of the items sent to them was recycled, reused, refurbished, incinerated or landfilled, they refused, on the ground that no regulation requires such a report. This leaves a company that wants to act responsibly exposed to reputational risk if a licensed partner is later found to have handled waste improperly. The concern echoes earlier calls for stronger enforcement in the Malaysian e-waste regime (Shad et al., 2020).

> *"At the moment recyclers have a license from Department of Environment … The problem is there is no further regulation, no further implementation … on the recyclers beyond just a license … They refuse to give you that number and when you say, 'Okay, we won't work with you if you can't give us the report', they say, 'Well, no one in the ecosystem is gonna give it [to] you because we are not required by any regulations to do this.'"*

The second obstacle is the economics of collection. Logistics is the largest cost for recyclers, and the value recovered from household items does not cover it. Recyclers therefore shift towards large corporate clients who generate e-waste in bulk. The consequence is that household collection becomes unviable, and the company had to close some of its public collection programmes. The respondent also observed that public awareness remains the weakest link, because convenience still outweighs environmental concern for most households. This mirrors the wider finding that recycling operations in Malaysia are constrained by collection infrastructure rather than by technology (Yun et al., 2019).

> *"In terms of … the public related programs, the biggest challenge is that logistics is a large cost … a lot of e-waste recyclers that we have worked with are now saying it's too expensive for them to do collection nationwide. They do not generate any value, they constantly lose … So they have to move their business model more and more towards working with … customers who have large scale electronic waste."*

Asked how practice could be improved more widely, the respondent argued that waste should be treated as a business ethos rather than a separate programme. Sustainable waste practice should be raised in school and community programmes, in

work with non-governmental organisations, and in supply chain requirements, so that suppliers are held to written procedures. Taken together, the interview suggests that progress depends on three things: tighter regulation of licensed recyclers, a workable solution to the cost of household collection, and sustained awareness work with the general public.

> *"We all can do better if we really [want] to enhance the awareness around waste practices across all of our programs … when we work with our supply chain, we need [to] have waste practices … SOPs that they have to comply [with] … It needs to be a business ethos."*

CHAPTER 5: DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter brings together the findings reported in Chapter 4 and explains what they mean. Section 5.2 discusses the results for each research objective in turn, covering the level of e-waste information disclosure in Malaysia and Indonesia, the themes disclosed, the effect of corporate governance mechanisms on disclosure in both countries, and the interview evidence on how these mechanisms work in practice. Section 5.3 draws the conclusion and sets out the theoretical and practical implications of the study. Section 5.4 states the limitations of the study and suggests directions for future research.

The discussion is guided by stakeholder theory, which holds that firms disclose information to respond to the claims of groups that affect or are affected by their operations. The findings are also read against the reporting rules in both countries, namely the Malaysian Code on Corporate Governance (MCCG 2021) and Bursa Malaysia's sustainability reporting requirements, and Indonesia's OJK Regulation No. 51/POJK.03/2017 and related governance guidelines.

5.2 Discussion

The first objective was to compare the level of e-waste information disclosure in Malaysia and Indonesia. The results show that disclosure is low in both countries. Malaysian firms disclosed an average of 2.97 sentences on e-waste, while Indonesian firms disclosed an average of 2.01 sentences. The minimum in both samples was zero, indicating that some firms made no reference to e-waste at all. The maximum values of 22 sentences in Malaysia and 25 in Indonesia show that a small number of firms report in detail. Disclosure quality was similarly low, with mean scores of 1.13 out of 3 in Malaysia and 1.03 out of 3 in Indonesia. Malaysia holds a slight lead on both measures, which is consistent with its longer-established reporting framework under Bursa

Malaysia. The wide dispersion within each country is nevertheless more significant than the gap between them. It indicates that e-waste reporting remains a matter of firm discretion rather than common practice, as neither jurisdiction requires e-waste to be reported as a separate item.

The second objective was to compare the themes disclosed, and here the two countries differ markedly. Malaysian firms reported across a wider set of themes and concentrated on the handling of equipment after use, led by recycling (31.7% of firms), proper disposal (21.6%) and adherence to protocols (16.8%). Indonesian firms concentrated on the act of reporting itself (25.9%), with recycling a distant second (7.4%). This suggests that Malaysian disclosure reflects actual operations, whereas Indonesian disclosure is driven mainly by the obligation to publish a sustainability report under OJK Regulation No. 51/POJK.03/2017. What the two countries share is more significant. Themes at the top of the waste hierarchy are almost absent, with reduction and reuse reported by fewer than 5% of firms in both samples. Firms in both countries therefore treat e-waste as a disposal problem rather than a design or procurement problem, which indicates that e-waste management in the region remains at an early stage.

The third and fourth objectives concerned the effect of corporate governance on disclosure and how these mechanisms work. In Malaysia, board size had a negative and significant effect on both disclosure quantity and quality. Larger boards disclose less, which suggests that coordination problems and competing priorities crowd out environmental matters. Board gender diversity, managerial ownership and industry type had positive and significant effects, while the sustainability steering committee was positive but only marginally significant. Board independence, board meeting frequency, institutional ownership and firm size had no significant effect. In Indonesia, board size was negative and significant for disclosure quantity only, and the sustainability steering committee was again positive and marginally significant for both measures. Board meeting frequency was positive and significant for quality, while board gender diversity was negative and significant for quality. Board independence, both ownership variables and firm size had no significant effect.

Read together, these results point to a single conclusion. Formal governance structures do not raise e-waste disclosure on their own. What matters is whether stakeholder claims actually reach the board agenda and are acted upon. Board independence is the clearest illustration. Both countries set expectations regarding independent directors, yet independence had no effect in either sample. Stakeholder theory positions independent directors as the members best placed to carry external claims into the boardroom, but the results suggest that this role is not yet being performed in either country. The sustainability steering committee results point in the same direction. The committee is the one mechanism that operated in both samples, as it provides stakeholder concerns with a formal route to the board. The effect is only marginal, however, because many committees still lack authority and resources.

The two countries also differ in ways that reflect their institutional settings. Board gender diversity was influential in Malaysia but not in Indonesia. Malaysia supports diversity through policy, including Bursa Malaysia's requirement for at least one woman director and the national target of 30%, whereas Indonesia imposes no legal quota. Women directors in Indonesia frequently hold advisory rather than executive roles, so their presence does not translate into influence over voluntary reporting. Managerial ownership was likewise influential in Malaysia but not in Indonesia, and this difference is a reporting artefact as much as a governance one. Indonesian family control is exercised indirectly through holding companies and is therefore not captured by managerial ownership in OJK and IDX filings. Institutional ownership had no effect in either country. Institutional investors hold power in both markets, but their claims remain financial, so managers face little pressure from them on environmental reporting.

The interview evidence helps to explain why the structural variables behave as they do. The respondent, the head of sustainability at a Malaysian listed telecommunications company, identified regulation and senior management commitment as the two decisive factors. The ability to point to a legal requirement was what prompted other divisions to act, and support from three C-suite members, including the chief executive, was what sustained the work. She also explained why the sustainability committee in her company is effective. Its members are drawn from senior management rather than from sustainability staff alone, and internal audit reports

on waste practice directly to the board audit committee. This supports the marginal committee results in both samples, as a committee affects disclosure only when it holds genuine authority. On board diversity, she identified a clear link to stronger sustainability practice and extended the point beyond gender to nationality and background, on the ground that differing perspectives are what force environmental matters onto the board agenda.

The interview also corroborates the ownership results. The respondent reported that investors enquire about compliance and carbon targets once a year by email, and that no question raised at general meetings concerns sustainability, as the questions focus on shareholder value and dividends. Pressure from customers and suppliers was similarly absent, and pressure on suppliers flowed outwards from her company. This is consistent with the insignificant institutional ownership coefficients in both samples. Two obstacles she raised lie outside the governance variables but constrain what any firm can achieve. First, e-waste recyclers hold a licence from the Department of Environment but face no further oversight, and they decline to report what becomes of the items they receive, which leaves responsible firms exposed to reputational risk. Second, logistics is the largest cost in collection, and the value recovered from household items does not cover it, so recyclers move towards bulk corporate clients and public collection programmes close down.

Taken as a whole, the findings support stakeholder theory but qualify how it applies in these two markets. Disclosure responds to claims that are both powerful and urgent. Regulators and environmentally sensitive industry conditions met that test, as industry type was the strongest and most consistent predictor in both countries. Investors, customers and suppliers did not, at least on environmental matters. Governance mechanisms mattered only where they provided a stakeholder claim with a working route into board decisions. This helps to explain the modest explanatory power of both models, at 8.2% for Malaysia and 25.9% for Indonesia ($R2 = 0.082$ and 0.259 respectively), since structural governance variables capture only part of what drives disclosure.

5.3 Conclusion

This study set out to compare e-waste information disclosure in Malaysia and Indonesia and to examine how corporate governance mechanisms affect it. Using content analysis of the reports of Malaysian and Indonesian listed firms, yielding 416 and 81 firm-year observations respectively , supported by an interview with the head of sustainability at a Malaysian listed company, the study reaches three main conclusions. First, e-waste disclosure is low and uneven in both countries, and firms report mainly on downstream handling rather than on the reduction or reuse of equipment. Malaysian firms report more operational detail, whereas Indonesian firms refer to e-waste largely to satisfy sustainability reporting requirements. Second, corporate governance affects disclosure, but not through the mechanisms most often assumed. Board size reduces disclosure in both countries, board independence has no effect in either, and the sustainability steering committee is the only mechanism with a consistent positive effect. Third, industry type is the strongest driver in both markets, which indicates that external scrutiny does more to advance disclosure than internal structure does.

The study makes three contributions to the literature. It extends stakeholder theory to e-waste reporting by showing that a governance mechanism raises disclosure only when it gives a stakeholder claim a working route into board decisions, rather than by its formal existence. It provides comparative evidence from two ASEAN markets with similar e-waste pressures but different reporting regimes, which allows the effect of the regulatory setting to be seen. It also combines content analysis with interview evidence, so the statistical patterns can be read against an account of how e-waste practice is actually managed inside a firm.

The findings carry practical implications for regulators. Because industry exposure and regulation drive disclosure more than board structure does, the clearest way forward is a specific reporting requirement for e-waste. Bursa Malaysia and the OJK could treat e-waste as a named indicator within their sustainability reporting frameworks, with separate reporting of volumes generated and their final destination. The interview also points to two gaps that regulation alone would not close. Licensed recyclers should be required to report what happens to the items they receive, since firms cannot presently verify the claims they make about recycling. The cost of

household collection also needs to be addressed, through shared collection infrastructure or producer responsibility schemes, because recyclers cannot cover the logistics cost from recovered value alone.

For companies, the findings suggest that a sustainability committee is worth establishing only if it holds decision-making authority and includes senior management. Assurance arrangements matter for the same reason, and reporting on waste practice to the board audit committee rather than to management raises accountability. Boards should also be kept at a workable size and drawn from varied backgrounds, since both features affect whether environmental matters reach the agenda. Firms should extend attention upstream as well, through procurement and leasing arrangements and through written waste requirements for suppliers, because reducing and reusing are where both countries are currently weakest.

5.4 Limitations of the study and avenues for future research

This study has several limitations. The first concerns the samples. The Malaysian sample of 416 firm-year observations is much larger than the Indonesian sample of 81, because far fewer Indonesian firms disclose e-waste information. The Indonesian results should therefore be read with care, as a small sample reduces the power of the regression and makes the coefficients more sensitive to individual firms. The second limitation concerns the measures. Disclosure quantity was measured by counting sentences and quality by a four-point index, so both capture what firms say rather than what they do. A firm that reports at length is not necessarily a firm that manages e-waste well.

The third limitation concerns the governance variables. The study used structural measures such as board size, independence and meeting frequency, which are observable in annual reports but reveal nothing about what boards actually discuss. The results suggest that this is precisely where the explanation lies, which is why the models explain only 8.2% and 25.9% of the variation in disclosure. The fourth limitation concerns the qualitative evidence. Only one interview was conducted, with a Malaysian telecommunications firm that is more advanced than most in its e-waste practice. The

account is useful for explaining the Malaysian results but cannot be generalised, and no Indonesian firm was interviewed, so the Indonesian results rest on the quantitative evidence alone.

These limitations point to several avenues for future research. Future studies could widen the sample to other ASEAN countries such as Thailand, Vietnam and the Philippines, which face similar e-waste pressures under different reporting regimes, and could extend the period to cover the years after the mandatory sustainability committee and assurance requirements took effect in both countries. This would allow a before-and-after comparison of the effect of regulation on disclosure.

Future work could also improve the measures. Disclosure could be paired with performance data, such as reported volumes of e-waste and recycling rates, to test whether firms that disclose more also perform better. Governance could be measured in ways that capture board behaviour rather than board structure, for example by examining whether e-waste appears on board agendas, whether the sustainability committee holds decision-making authority, and whether waste practice is subject to internal or external assurance. Given the ownership findings, a closer look at family control in Indonesia would also be valuable, using beneficial ownership data rather than the managerial shareholding recorded in OJK and IDX filings. Finally, a larger set of interviews across both countries, including with regulators and licensed recyclers, would help explain why disclosure remains concentrated on disposal and what would move firms towards reducing and reusing.

REFERENCES

Ab-Aziz, N. F., Shafai, N. A., Abd-Mutalib, H., & Nor-Ahmad, S. N. H. J. N. (2023). E-Waste Information Disclosure: A Study On Malaysian Public Listed Companies. *International Journal of Business and Management*, *7*(2), 01-07. https://doi.org/10.26666/rmp.ijbm.2023.2.1

Abd-Mutalib, H., Muhammad Jamil, C. Z., Mohamed, R., Shafai, N. A., & Nor-Ahmad, S. N. H. J. N. (2021). Firm and Board Characteristics, and E-Waste Disclosure: A Study in the Era of Digitalisation. *Sustainability*, *13(18)*, 10417. https://doi.org/10.3390/su131810417

Abd-Mutalib, H., Shafai, N. A., Nor-Ahmad, S. N. H. J. N., Muhammad Jamil, C. Z., & Mohamed, R. (2025). Exploring the Influence of Internal and External Factors on E-Waste Management Practices in Malaysia: Examining the Significance of Eco-Efficiency Strategy. *Paper Asia*, *41*(1b), 58-69. https://doi.org/10.59953/paperasia.v41i1b.328

Alias, A. F., Ishak, M. B., Zulkifli, S. N. A. M., & Jalil, R. A. (2014). E-waste management: An emerging global crisis and the Malaysian scenario. International Journal of Environmental Sciences, 4(4), 444–457.

Baldé, C. P., Forti, V., Gray, V., Kuehr, R., & Stegmann, P. (2017). *The Global E-Waste Monitor 2017: Quantities, Flows, and Resources*. United Nations University (UNU), International Telecommunication Union (ITU), and International Solid Waste Association (ISWA).

Baldé, C. P., Kuehr, R., Yamamoto, T., McDonald, R., D'Angelo, E., Althaf, S., Bel, G., Deubzer, O., Fernandez-Cubillo, E., Forti, V., Gray, V., Herat, S., Honda, S., Iattoni, G., Khetriwal, D. S., di Cortemiglia, V. L., Lobunstova, Y., Nnorom, I., Pralat, N., & Wagner, M. (2024). *The Global E-Waste Monitor 2024*. https://ewastemonitor.info/the-global-e-waste-monitor-2024/

Basel Convention. (n.d.). *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*. Retrieved 2026 from https://www.basel.int/Implementation/Ewaste/Overview/tabid/4063/Default.aspx

Ben-Amar, W., Chang, M., & McIlkenny, P. (2017). Board gender diversity and corporate response to sustainability initiatives: Evidence from the Carbon Disclosure Project. *Journal of Business Ethics, 142(2), 369-383*. https://doi.org/10.1007/s10551-015-2759-1

Bursa Malaysia. (2018). *Bursa Malaysia Sustainability Guide, 2nd ed.* Kuala Lumpur, Malaysia: Bursa Malaysia Securities Berhad

Cadbury, A. (1992). *Report of the Committee on the Financial Aspects of Corporate Governance*. Gee.

Cicchiello, A. F., Fellegara, A. M., Kazemikhasragh, A., & Monferra, S. (2021). Gender diversity on corporate boards: How Asian and African women contribute on sustainability reporting activity. *Gender in Management: An International Journal, 36(7)*, 801-820. https://doi.org/10.1108/GM-05-2020-0147

Cormier, D., Magnan, M., & Van Velthoven, B. (2005). Environmental disclosure quality in large German companies: Economic incentives, public pressures or institutional conditions? *European Accounting Review, 14(1), 3-39*. https://doi.org/10.1080/0963818042000339617

Department of Environment Malaysia. (2023). *Guidelines for the classification of used electrical and electronic equipment in Malaysia*. Department of Environment, Ministry of Natural Resources and Environmental Sustainability.

Dinas Lingkungan Hidup DKI Jakarta. (2024). *Limbah elektronik*. Pemerintah Provinsi DKI Jakarta. https://www.jakarta.go.id/e-waste

Donaldson, T., & Preston, L. E. (1995). The stakeholder theory of the corporation: Concepts, evidence, and implications. *Academy of Management Review*, *20*(1), 65-91.

Eng, L. L., & Mak, Y. T. (2003). Corporate governance and voluntary disclosure. *Journal of Accounting and Public Policy, 22(4), 325-345*. https://doi.org/10.1016/S0278-4254(03)00037-1

Esa, E., & Mohd Ghazali, N. A. (2012). Corporate social responsibility and corporate governance in Malaysian government-linked companies. *Corporate Governance: The International Journal of Business in Society, 12(3), 292-305*. https://doi.org/10.1108/14720701211234564

Faisal, A. K. M., Ankhi, I. J., Hossain, G. A., Ahmed, M. M., Siddhpura, M., & Masud, M. H. (2025). Emerging concerns associated with E-waste exposure in Bangladesh. *Environmental Science and Pollution Research, 32(14)*, 8595-8628. https://doi.org/10.1007/s11356-025-36268-9

Fama, E. F., & Jensen, M. C. (1983). Separation of ownership and control. *The Journal of Law and Economics, 26(2), 301-325*. https://doi.org/10.1086/467037

Forti, V., Baldé, C. P., Kuehr, R., & Bel, G. (2020). *The Global E-Waste Monitor 2020: Quantities, Flows and the Circular Economy Potential*. https://ewastemonitor.info/gem-2020/

Freeman, R. E. (1984). *Strategic Management: A Stakeholder Approach*. Pitman.

Giannarakis, G., Andronikidis, A., & Sariannidis, N. (2020). Determinants of environmental disclosure: Investigating new and conventional corporate governance characteristics. *Annals of Operations Research, 294(1-2)*, 87-105. https://doi.org/10.1007/s10479-019-03323-x

Grant, K., Goldizen, F. C., Sly, P. D., Brune, M. N., Neira, M., van den Berg, M., & Norman, R. E. (2013). Health Consequences of Exposure to E-waste: A Systematic Review. *The Lancet Global Health*, *1*(6), 350-361. https://doi.org/10.1016/S2214-109X(13)70101-3

Hamzah, N., & Abdullah, M. (2018). Stakeholder power towards corporate social and environmental responsibility disclosure: Evidence from Malaysia. *Asian Journal of Accounting and Governance, 9*, 1-12.

Haniffa, R. M., & Cooke, T. E. (2005). The impact of culture and governance on corporate social reporting. *Journal of Accounting and Public Policy, 24(5), 391-430*. https://doi.org/10.1016/j.jaccpubpol.2005.06.001

Harrison, J. S., Bosse, D. A., & Phillips, R. A. (2010). Managing for stakeholders, stakeholder utility functions, and competitive advantage. *Strategic Management Journal, 31(1)*, 58-74.

Hashim, R., Salleh, N. A., Ibrahim, J. A., & Mohd Zahari, F. (2024). The Challenges of E-Waste Management at Public Universities in Malaysia: From the Lenses of University Students. *International Journal of Advanced Research in Education and Society*, *6*(4), 327-338. https://doi.org/10.55057/ijares.2024.6.4.28

Honda, S., Khetriwal, D. S., & Kuehr, R. (2016). *Regional E-Waste Monitor: East and Southeast Asia*. https://ewastemonitor.info/rem-2016/

Huang, W., Shi, X., & Wu, K. (2021). Human Body Burden of Heavy Metals and Health Consequences of Pb Exposure in Guiyu, an E-Waste Recycling Town in China. *International Journal of Environmental Research and Public Health*, *18*(23), 12428. https://doi.org/10.3390/ijerph182312428

Indonesia Environment and Energy Center. (2024). *Timbunan sampah elektronik dan pengelolaannya di Indonesia*. https://environment-indonesia.com/timbunan-sampah-elektronik-dan-pengelolaanya-di-indonesia/

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

Jizi, M. (2017). The influence of board composition on sustainable development disclosure. *Business Strategy and the Environment, 26(5), 640-655*. https://doi.org/10.1002/bse.1943

Jones, T. M. (1995). Instrumental stakeholder theory: A synthesis of ethics and economics. *Academy of Management Review, 20(2)*, 404-437.

Joseph, C., & Taplin, R. (2011). The Measurement of Sustainability Disclosure: Abundance versus Occurrence. *Accounting Forum*, *35*(1), 19-31. https://doi.org/10.1016/j.accfor.2010.11.002

Komite Nasional Kebijakan Governance. (2006). *Pedoman Umum Good Corporate Governance Indonesia*. Komite Nasional Kebijakan Governance.

Laksmana, I. (2008). Corporate board governance and voluntary disclosure of executive compensation practices. *Contemporary Accounting Research, 25(4), 1147-1182*. https://doi.org/10.1506/car.25.4.8

Liao, L., Luo, L., & Tang, Q. (2015). Gender diversity, board independence, environmental committee and greenhouse gas disclosure. *The British Accounting Review, 47(4), 409-424*. https://doi.org/10.1016/j.bar.2014.01.002

Mairizal, A. Q., Sembada, A. Y., Tse, K. M., & Rhamdhani, M. A. (2021). Electronic waste generation, economic values, distribution map, and possible recycling system in Indonesia. *Journal of Cleaner Production, 293, 126096*. https://doi.org/10.1016/j.jclepro.2021.126096

Mohamad, N. S., Thoo, A. C., & Huam, H. T. (2022). The Determinants of Consumers' E-Waste Recycling Behavior through the Lens of Extended Theory of Planned Behavior. *Sustainability*, *14*(15), 9031. https://doi.org/10.3390/su14159031

Mohd Ghazali, N. A. (2007). Ownership structure and corporate social responsibility disclosure: Some Malaysian evidence. *Corporate Governance: The International Journal of Business in Society, 7(3), 251-266*. https://doi.org/10.1108/14720700710756535

Mohd Yahya, A. S., Tengku Hamzah, T. A. A., & Aziz Shafie, A. (2022). Knowledge of E-Waste Recycling Among Communities in Selangor, Malaysia. *Southeast Asia: A Multidisciplinary Journal*, *22*(1), 5-22.

Ngu, S. B., & Amran, A. (2021). Materiality disclosure in sustainability reporting: Evidence from Malaysia. Asian Journal of Business and Accounting, 14(1), 243-276.

Nik Azman, N. A. N., & Mohd Salleh, S. (2020). Finding the Link between Corporate Financial Performance and E-Waste Reporting. Global Business and Management Research: An International Journal, 12(4), 122-129.

Nik Azman, N. A. N., Mohd Salleh, S., Wan Hanafi, W. N., Ya'acob, N. S., Alrazi, B., & Yusoff, H. (2024). An exploratory study on e-waste reporting: A review of annual reports from Malaysian public listed companies. European Journal of Sustainable Development, 13(3), 504–524.

Ntim, C. G., & Soobaroyen, T. (2013). Black economic empowerment disclosures by South African listed corporations: The influence of ownership and board characteristics. Journal of Business Ethics, 116(1), 121-138. https://doi.org/10.1007/s10551-012-1465-5

OECD. (2015). *G20/OECD Principles of Corporate Governance*. OECD Publishing. https://doi.org/10.1787/9789264236882-en

Oh, W. Y., Chang, Y. K., & Martynov, A. (2011). The effect of ownership structure on corporate social responsibility: Empirical evidence from Korea. Journal of Business Ethics, 104(2), 283-297. https://doi.org/10.1007/s10551-011-0912-z

Orisakwe, O. E., Frazzoli, C., Ilo, C. E., & Oritsemuelebi, B. (2019). Public health burden of e-waste in Africa. *Journal of Health and Pollution, 9(22)*, 190610. https://doi.org/10.5696/2156-9614-9.22.190610

Otoritas Jasa Keuangan. (2014). Peraturan Otoritas Jasa Keuangan Nomor 33/POJK.04/2014 tentang Direksi dan Dewan Komisaris Emiten atau Perusahaan Publik. Otoritas Jasa Keuangan.

Otoritas Jasa Keuangan. (2015). Peraturan Otoritas Jasa Keuangan Nomor 21/POJK.04/2015 tentang Penerapan Pedoman Tata Kelola Perusahaan Terbuka. Otoritas Jasa Keuangan.

Otoritas Jasa Keuangan. (2017). Peraturan Otoritas Jasa Keuangan Nomor 51/POJK.03/2017 tentang Penerapan Keuangan Berkelanjutan bagi Lembaga Jasa Keuangan, Emiten, dan Perusahaan Publik. Otoritas Jasa Keuangan.

Paminto, A. K., Lautetu, L. M., Prayoga, M. B. R., Meyta R, C., & Debora, D. D. (2024). Evaluasi pengelolaan limbah elektronik di Indonesia. *Waste, Society and Sustainability, 1(1), 1-22*. https://doi.org/10.61511/wass.v1i1.2024.462

Parvez, S. M., Jahan, F., Brune, M. N., Gorman, J. F., Rahman, M. J., Carpenter, D., Islam, Z., Rahman, M., Aich, N., Knibbs, L. D., & Sly, P. D. (2021). Health consequences of exposure to e-waste: An updated systematic review. *The Lancet Planetary Health, 5(12)*, e905-e920. https://doi.org/10.1016/S2542-5196(21)00263-1

Permatasari, Y., Rosyidah, M. A., Nurrahmawati, A., Mohd Zamil, N. A., & Ekasari, W. F. (2025). Exploring the role of sustainability committees in carbon performance: Evidence from ASEAN-5 for good or for worse? *Corporate Social Responsibility and Environmental Management, 32(5)*, 7102-7118. https://doi.org/10.1002/csr.70079

Peters, G. F., & Romi, A. M. (2014). Does the voluntary adoption of corporate governance mechanisms improve environmental risk disclosures? Evidence from greenhouse gas emission accounting. *Journal of Business Ethics, 125(4), 637-666*. https://doi.org/10.1007/s10551-013-1886-9

Republic of Indonesia. (2008). Law No. 18 of 2008 on Waste Management [Undang-Undang Nomor 18 Tahun 2008 tentang Pengelolaan Sampah]. State Secretariat of the Republic of Indonesia.

Republic of Indonesia. (2014). Government Regulation No. 101 of 2014 on the Management of Hazardous and Toxic Waste [Peraturan Pemerintah Nomor 101 Tahun 2014 tentang Pengelolaan Limbah Bahan Berbahaya dan Beracun]. State Secretariat of the Republic of Indonesia.

Republic of Indonesia. (2017). Presidential Regulation No. 97 of 2017 on the National Policy and Strategy for the Management of Household Waste and Household-

Like Waste [Peraturan Presiden Nomor 97 Tahun 2017]. State Secretariat of the Republic of Indonesia.

Republic of Indonesia. (2020). Government Regulation No. 27 of 2020 on the Management of Specific Waste [Peraturan Pemerintah Nomor 27 Tahun 2020 tentang Pengelolaan Sampah Spesifik]. State Secretariat of the Republic of Indonesia.

Republic of Indonesia. (2021). Government Regulation No. 22 of 2021 on the Implementation of Environmental Protection and Management [Peraturan Pemerintah Nomor 22 Tahun 2021 tentang Penyelenggaraan Perlindungan dan Pengelolaan Lingkungan Hidup]. State Secretariat of the Republic of Indonesia.

Republic of Indonesia, Ministry of Environment and Forestry. (2024). Ministerial Regulation No. 9 of 2024 on the Management of Waste Containing Hazardous and Toxic Materials and Hazardous and Toxic Waste [Peraturan Menteri Lingkungan Hidup dan Kehutanan Nomor 9 Tahun 2024]. Ministry of Environment and Forestry.

Roscoe, J. T. (1975). *Fundamental research statistics for the behavioral sciences* (2nd ed.). Holt, Rinehart and Winston.

Rupley, K. H., Brown, D., & Marshall, R. S. (2012). Governance, media and the quality of environmental disclosure. *Journal of Accounting and Public Policy, 31(6), 610-640*. https://doi.org/10.1016/j.jaccpubpol.2012.09.002

Said, R., Zainuddin, Y. H., & Haron, H. (2009). The relationship between corporate social responsibility disclosure and corporate governance characteristics in Malaysian public listed companies. *Social Responsibility Journal, 5(2), 212-226*. https://doi.org/10.1108/17471110910964496

Sangwijit, C., Ong-Artborirak, P., Naksen, W., Kallawicha, K., & Siewchaisakul, P. (2025). Health Effects of Heavy Metal Exposure among E-Waste Workers and Community-Dwelling Adults in Thailand: A Cross-Sectional Study. *Journal of Preventive Medicine and Public Health*, *58*(2), 156-166. https://doi.org/10.3961/jpmph.24.415

Securities Commission Malaysia. (2021). *Malaysian Code on Corporate Governance*. Securities Commission Malaysia.

Shad, K. M., Ling, S. T. Y., & Karim, M. E. (2020). Sustainable e-waste management in Malaysia: Lessons from selected countries. IIUM Law Journal, *28*(2).

Shaharudin, M. R., Said, R., Hotrawaisaya, C., Nik Abdul Rashid, N. R., & Azman Perwira, N. F. S. (2020). Linking determinants of the youth's intentions to dispose of portable e-waste with the proper disposal behavior in Malaysia. *The Social Science Journal*. https://doi.org/10.1080/03623319.2020.1753157

Sheikh Abu Bakar, A. B., Mohd Ghazali, N. A. B., & Ahmad, M. B. (2019a). Sustainability reporting and board diversity in Malaysia. *International Journal of Academic Research in Business and Social Sciences, 9(3)*, 91-99.

Sheikh Abu Bakar, A. B., Mohd Ghazali, N. A. B., & Ahmad, M. B. (2019b). Sustainability Reporting in Malaysia: The Extent and Quality. *International Journal of Academic Research in Business and Social Sciences*, *9*(5), 816-835.

Thong, K. C., & Wong, W. P. (2018). Pathways for sustainable supply chain performance: Evidence from a developing country, Malaysia. *Sustainability, 10(8)*, 2781.

Wallwey, C., & Kajfez, R. L. (2023). Quantitative Research Artifacts as Qualitative Data Collection Techniques in a Mixed Methods Research Study. *Methods in Psychology*, *8*, 100115. https://doi.org/10.1016/j.metip.2023.100115

Walter, L., & Weber, N. (2015). Implementation of sustainable forest management: An application of the triple perspective typology of stakeholder theory in a case study in Sabah, Malaysia. *Journal of Forest and Landscape Research, 1(1)*, 1-11.

Wang, Z., Jung, C. R., Wang, S., Nakayama, S. F., Kido, T., Li, L., & Sun, X. L. (2026). Effect of Perinatal Multiple Exposures to Heavy Metals and Dioxins on Serum Steroids in Preschool Children — A Follow-Up Study in an E-Waste Contaminated Area in China. *Journal of Applied Toxicology*. https://doi.org/10.1002/jat.70067

Waste4Change. (2022). *Pengelolaan sampah elektronik dan peraturannya di Indonesia*. https://waste4change.com/blog/pengelolaan-sampah-elektronik-dan-peraturannya-di-indonesia/

Ya'acob, N. S., Alrazi, B., Nik Azman, N. A. N., Mohd Salleh, S., & Md Yatim, N. (2023). E-waste recycling behaviour in Malaysia – A review. European Proceedings of Finance and Economics, 462–474. https://doi.org/10.15405/epfe.23081.40

Yun, Y. S., Lim, Y. A., & Ilankoon, I. M. S. K. (2019). An analysis of electronic waste management strategies and recycling operations in Malaysia: Challenges and future prospects. *Journal of Cleaner Production, 224*, 151-166. https://doi.org/10.1016/j.jclepro.2019.03.205

Zulkefli, A. F., Abd Rahim, M., & Tahir, N. S. (2025). Barriers to ESG adoption in Malaysian SMEs: A stakeholder theory perspective. *Environment-Behaviour Proceedings Journal*.

APPENDIX 1: INTERVIEW PROTOCOL

Study title:
A Comparative Study on E-Waste Information Disclosure between Malaysia and Indonesia: The Role of Corporate Governance Mechanism

Respondent:
officer responsible for sustainability or environmental management in a public-listed company

Mode:
online interview (video call), audio recorded with permission

Estimated duration: 45 to 60 minutes

Language: English or Bahasa Melayu, as preferred by the respondent

Opening statement (read to the respondent)
Thank you for agreeing to take part in this study. The study looks at how companies in Malaysia and Indonesia report e-waste information, and at the role of corporate governance in that process. There are no right or wrong answers. We are interested in your own experience and views. Your name and your company's name will not be reported. The interview will be recorded so that we can prepare an accurate transcript, and the recording will be kept confidential and used for research only. You may decline to answer any question or stop the interview at any time. Do you agree to take part, and do you agree to the recording?

Part A: Background of the respondent
A1. May I know your position in the company and how long you have held this role?
A2. Which part of your work deals with waste, and with electronic waste in particular?
A3. Could you describe briefly the operations of your company that produce electronic waste?

Part B: Main questions

Q1. Could you describe the e-waste activities and practices of your company?
Probes: What definition of e-waste does the company use? Does the company keep a waste inventory, and what does it cover? Which operations produce the most e-waste? How is the waste collected, recorded and reported? Who handles the waste after it leaves the company? Are there any programmes for the public or for the community?

Q2. In your view, does corporate governance strengthen e-waste management practice in your company? If yes, how?
Probes: What role do the board and senior management play? Is there a sustainability committee, and who sits on it? How are waste practices reviewed or audited, and to whom are the findings reported? Does the mix of directors on the board, including gender and background, make any difference to how environmental matters are discussed?

Q3. Does the ownership structure of your company strengthen e-waste management practice? If yes, how?
Probes: Do investors ask about waste or environmental matters, and how often? Are such questions raised at the annual general meeting? Does shareholding by directors or managers change how these matters are treated? Is there any pressure from customers, suppliers or other outside parties?

Q4. What other factors contribute to better e-waste management in your company?
Probes: How important is regulation? What role do cost, technology, staff awareness and training play? What obstacles make good practice difficult, whether inside the company or in the wider recycling industry?

Part C: Closing
C1. In your view, how can e-waste management and e-waste reporting be improved more widely, whether by companies, regulators or the public?
C2. Is there anything else you would like to add that we have not covered?
C3. May we contact you again if we need to clarify any point?

Note on use
The four questions in Part B are the main questions of the interview. The probes are used only when needed, to encourage the respondent to explain further. The order of the questions may be adjusted to follow the flow of the conversation. Each interview is recorded, transcribed and then analysed by theme.