

# E-Waste Information Disclosure: A Study On Malaysian Public Listed Companies

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**Abstract:** In this era of globalisation, the demand for electrical and electronic devices has surged, and the media and research studies have highlighted the poor management of electrical and electronic waste (e-waste). The issue is more pronounced following the COVID-19 aftermath as companies are shifting to using these devices in operating their businesses which spurs the attention on managing e-waste. Likewise, this new norm shows continuous trends and seems to remain. As such, this research aims to investigate the Malaysian publicly listed companies' commitment to e-waste management by examining the extent and quality of e-waste information disclosure. Using the annual report of 274 listed companies spanning from 2019 to 2021, this study employed content analysis to determine the extent and quality of e-waste information disclosure by examining the number of words and sentences and the 4-point quality scale measures accordingly. Additionally, this study explores the difference in the extent and quality of e-waste information disclosure between industries. In correspondence to the 14 industries examined, this study found that the highest number of words, sentences and quality of e-waste information disclosure was from the telecommunication and media industries, followed by the technology industry. Likewise, an independent t-test reveals that the telecommunication and media and technology industries showed significant differences from other industries' efforts to provide adequate and quality e-waste information disclosure. The results reflect the law-abiding efforts among these industries on mandatory requirements of reporting e-waste management activities in the annual report. The findings of this study provide some insight into companies' commitment to reporting and managing their e-waste, which increases transparency, accountability, legitimacy and enhances the environmental reporting model. It is expected that the results will be of immense benefit to various stakeholders in making green investment more transparent.

**Keywords:** *E-Waste, Disclosure, Reporting, Legitimacy Theory, Malaysia*

## 1. Introduction

Environmental sustainability has gained recognition all over the world, and Malaysia has not left behind in its dedication to the environment. One of the pillars in the 12th Malaysia Plan has highlighted pursuing green growth for sustainability and resilience. In this pillar, Malaysia focused on pursuing sustainable development by shifting the narrow

environmental focus on natural assets to include consumption and production processes in all sectors and households [1].

Every degree of society needs to contribute to the national agenda for environmental sustainability to be accomplished. The era of digitisation has accelerated the use of electric and electronic parts, which eventually approach the end of their useful lives. In addition, since the

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COVID-19 pandemic, reliance on electric and electronic devices has grown substantially. Lockdowns caused by COVID-19 stimulate more indoor activities such as working from home and attending classes, shopping and hanging out online, streaming movies, and others. This circumstance raises the topic of how these used or obsolete components are being treated. The used or obsolete component, known as e-waste, is typically filled with extremely hazardous substances that harm human and animal health and the environment. E-waste that is not appropriately treated will eventually end up in landfills, endangering the environment and threatening human health [2].

Statistics on the generation of e-waste in the global context show alarming concern. According to the Global E-waste Monitor 2020 from the United Nations University, 53.6 metric tonnes (Mt) of e-waste were generated in 2019 [3], with Asian nations accounting for nearly half of this staggering amount (24.9 Mt) [4]. This situation may be worsened as it is estimated that by 2030, the world will face 74.7 Mt of e-waste generated [4] and 120 Mt in the year 2050 if some drastic actions are not taken up [5].

Focusing on Malaysia, e-waste is being spelt out as one of Malaysia's top six waste streams [6]. Furthermore, industrial e-waste generated by business organisations has shown a substantial increment of 60.3% from 2015 to 2017 [6]. Forti et al. [4] also recorded an e-waste generation of 364 kilotons (Kt) or 11.1 kg per person in 2019. To date, the DOE [2] envisaged the total amount of discarded e-waste to be increased by an average of 14% per year, and 21.38 Mt of e-waste would be generated by the year 2020.

The mentioned situation is likely alarming and causes concern among authorities and regulators. Authorities and regulators have pressured business organisations to dispose of their e-waste properly and to report measures taken concerning the company's obsolete electrical and electronic equipment to limit the damage from improperly managed e-waste. Additionally, Malaysia's current Sustainability Reporting Guide specifies that reporting e-waste falls under the environmental part of sustainability [7]. Despite the assistance of these guidelines, previous studies reported low reporting of e-waste by public listed companies [8] and the telecommunication and technology industries [9].

As one of the main contributors to e-waste generation, companies from various industries are expected to be committed to handling and managing e-waste following these disturbing numbers. The rationalisation is that every company is believed to produce e-waste, either in small or large volumes, especially during the COVID-19 pandemic, including the health care industry, the financial services industry and education institution [10,11]. Therefore, this research investigates how committed businesses are to managing their e-waste by observing the extent and quality of e-waste information disclosure of Malaysian publicly listed companies in all 14 industries.

## 2. Literature Review

### 2.1 Electric and Electronic Waste (E-Waste)

According to The Global E-waste Statistics Partnership [12], e-waste refers to all items of electrical and electronic equipment and parts that their owner has discarded as waste without the intent of re-use. The United Nations [13] defined e-waste as any "electrical or electronic equipment which is waste including all components, sub-assemblies and consumables, which are part of the product at the time of discarding". Generally, it can be concluded that e-waste implies the waste of electrical and electronic equipment (WEEE) that has reached the end of its useful life or has been discarded.

According to the Department of Environment [2], e-waste is a broken, non-working or old/obsolete electric electronic appliance such as a television, personal computer, air conditioner, washing machine and refrigerator. In Malaysia, e-waste is categorised as Scheduled Wastes under the Code SW110, First Schedule, Environmental Quality (Scheduled Wastes) Regulations 2005. Further, the department defined Code SW110 as waste from electrical and electronic assemblies that contain components such as accumulators, mercury switches, glass from cathode-ray tubes and other activated glass or polychlorinated biphenyl-capacitors, or contaminated with cadmium, mercury, lead, nickel, chromium, copper, lithium, silver manganese or polychlorinated biphenyl. These components are hazardous, and e-waste should be treated accordingly as it may jeopardise our lives and harm human health and the environment. Thus, hazardous waste disposal is a major challenge in e-waste management.

Several previous studies reported that improper handling of e-waste disposal might cause harmful effects. For instance, contaminated soil and water are unsafe for growing food and drinking [14]. Another disturbing effect of e-waste exposure is the adverse effect on pregnancy and neonatal health [15].

The harmful effects could be elevated as the number of e-waste generated shows an increasing trend. As documented in the United Nations Global E-waste Monitor Report 2020, globally, 53.6 million metric tonnes (Mt) were generated in the year 2019, which is 21 per cent higher than in the past five years. Besides, it is predicted that by the year 2030, e-waste could be generated 74 Mt [4]. However, Asia generated the most volume of e-waste in the year 2019, which contributed to the alarming statistics. Asia generated 24.9 Mt, followed by the Americas (13.1 Mt) and Europe (12 Mt), while Africa and Oceania generated 2.9 Mt and 0.7 Mt, respectively. In Malaysia, 364 kt or an average of 11.1kg per capita of e-waste was generated. Likewise, the DOE expected Malaysia to generate approximately 24.5 Mt of e-waste, which will continue to escalate over the years.

## 2.2 E-waste Studies in Malaysia

In Malaysia, research on waste management is expanding rapidly; however, only a few studies have specifically addressed e-waste management and practices. In 2010, [16] found that some households do not know how and where to discard their e-waste properly. This situation indicated low awareness among the households, and the researcher called for the respective authorities to strengthen their efforts in educating the public. Based on the study's findings, the majority of locals prefer to store or resell their used electronic equipment. As there is no effective take-back program for customers, only a smaller percentage of residents prefer to find a means to dispose of their electronic gadgets in recycling facilities. Subsequently, [17] reported that awareness, knowledge and risk perception of e-waste management positively and significantly influence attitudes towards e-waste management and attitudes positively influence recycling behaviour. This scenario was perhaps a success due to the authorities' proactive efforts. Likewise, a current study [18] showed that the respondents' e-waste disposal knowledge and e-waste disposal attitudes were at a high level, while their e-waste disposal practices were at a medium level.

The volume of e-waste is constantly rising, posing a severe environmental threat in many nations. E-waste management is inevitable and creating a comprehensive system to address it has emerged as a crucial socioeconomic and environmental concern for Malaysia's sustainable growth. Previous studies stated that Malaysia has several challenges in implementing the e-waste management process. Some of the challenges are unorganised collection system [19], lack of actual data on e-waste generation and expertise, shortage of ultramodern recycling plants, inadequate collection facilities [20], insufficient political and financial will to solve the problem of transboundary movement of e-waste and its residual [20]. Ismail and Hanafiah [22] evaluated the e-waste management systems in Malaysia and suggested that direct incineration with energy recovery was the best of the four management options evaluated for e-waste management.

Most previous studies discussed nations' awareness and management of e-waste. Nevertheless, studies on the dedication and reporting of corporate organisations' are still sparse. Nik Azman and Mohd Salleh [8] examined 59 Malaysian public companies, examining whether their performance was linked to their e-waste reporting. The researcher reported only a mean of 57% of e-waste reported by the sampled companies. Further, some companies failed to report any e-waste information. Another study by [24] reveals almost identical results: the level of e-waste reporting is at a mean of 58.06%. These studies were conducted in 2018, the same year as the mandatory enactment in the Sustainability Reporting Guide that required Bursa Malaysia listed companies to disclose their

commitments in handling e-waste, mainly applied to those involved in the telecommunication and technology industries. As such, this situation explains the weak extent and quality of e-waste information disclosure since these companies may need time to improve and enhance their policy and procedure in e-waste reporting.

Studies following the mandatory enactment are needed to see the level of compliance among companies listed in Bursa Malaysia. A recent study by [9] not only examined the extent and quality of e-waste reporting among telecommunication and technology industries but also investigated the effects of company size, company performance, board size and board gender diversity on e-waste reporting of 92 companies of telecommunication and technology companies. This comprehensive study found that only company size positively influences e-waste reporting, and the rest of the variables had no influence on e-waste reporting. Additionally, the findings show that only 16% of the companies disclose their commitment to managing e-waste. The disclosure demonstrates how little e-waste reporting is done and how little general, qualitative data is shared. Companies listed on the Main board report much more e-waste data than Ace board; likewise, the companies' e-waste information disclosure is not significantly different.

From the discussion above, empirical findings of Malaysia's dedication to managing e-waste are limited. By focusing on e-waste management and reporting, this study seeks to close this gap by assessing companies' stances on the environmental agenda. The results of this study are anticipated to aid Malaysia's strategy for reaching the Sustainability Development Goals 2030 and to find out whether the mandatory enactment by Bursa Malaysia could effectively enhance e-waste reporting.

## 3. Development of Hypotheses

Studies on sustainability reporting have gained attention among academicians, regulators and various stakeholders, and the trends seem to continue. The legitimacy theory was primarily employed in studies to support the companies' commitment to sustainability reporting or disclosure.

According to [26], legitimacy theory is based on the notion that an organisation and the society in which it operates have a 'social contract'. Therefore, companies aim to justify their business practices by engaging in sustainability reporting to get the acceptance of society (societal approach) and thereby guarantee their survival. Researchers also postulated that social contract encapsulates a wide range of expectations that society has for how an organisation ought to conduct its business [27], and this theory is based on the notion that organisations must behave in accordance with socially acceptable standards in order to continue operating successfully [28]. Correspondingly,

Guthrie and Parker [29] explained the influence of legitimacy theory over disclosure by stating that companies wanted the approval of their objectives, other rewards and their ultimate survival from society. Hence, disclose enough social information for society to assess whether they are a good corporate citizen. In legitimising its actions via disclosure, the corporation hopes ultimately to justify its continued existence.

Based on the legitimacy theory, a corporation must disclose more social activities following changes in the marketplace. Many studies adopted this theory to examine the movement of corporate social responsibility (CSR) disclosure responding to incidents. For instance, Esa and Mohd Ghazali [30] recorded an increasing CSR disclosure trend following Silver Book issuance in 2006. Ahmed Haji [31] mentioned that CSR disclosure increased significantly following financial crises and regulatory changes in the 2012 Malaysian Code of Corporate Governance (MCCG2012). The idea is that these companies aim to appear legitimate and reduce exposure from the public.

As such, this study hypothesises that the extent and quality of e-waste information disclosure shall increase following the mandatory enactment by Bursa Malaysia, as companies may have improved their e-waste reporting policy since the enactment was published.

#### 4. Research Methodology

The study samples consist of 960 Malaysian public listed companies from 2019 until 2021. The rationalisation for examining these three (3) year periods is mainly because the MCCG has required technology and telecommunication industries to report e-waste information disclosure since 2018 [32,33]. Hence, the year 2019 would be sufficient for the companies to amend and adopt the current practices and policies in improving their e-waste management, especially regarding e-waste reporting. The sampling was made using stratified random selection based on the type of industry. The final sample arrives at 274 samples (which are segregated into 14 industries). This sample size can be considered appropriate given that the population size is aligned with [34].

The study utilises a secondary data collection method. The data were gained from annual reports, corporate governance reports, and sustainability reports for the respective years. In addition, this study opted for content analysis in analysing the data. Content analysis is a method for obtaining and examining text content. Content refers to communication that words, meanings, images, symbols, ideas, or themes can convey [35]. The objective is to make replicable and credible references from data to their contexts [36]. This method has been commonly used in sustainability-related research, particularly in examining the extent and quality of sustainability disclosure.

Two measurements measure the extent of e-waste information disclosure: the number of words counts about

e-waste in the report and the number of sentences. Meanwhile, this study uses the 4-point quality scale to measure the quality of e-waste information disclosure, consistent with previous sustainability reporting studies.

### 4. Results

#### 5.1 Extent and Quality of E-waste Information Disclosure

Table 1: Descriptive Statistics for Number of Words of E-waste Information Disclosure

Industries	N	Mean	Min	Max
Construction	58	6.900	0.000	186
Consumer products & services	164	5.378	0.000	199
Energy	34	7.677	0.000	131
Financial Services	30	16.867	0.000	162
Health Care	11	0.000	0.000	0.000
Industrial Products & Services	227	1.634	0.000	220
Plantation	38	4.474	0.000	85
Property	107	7.047	0.000	196
Real Estate	15	0.000	0.000	0
Investment Trust				
Technology	40	26.500	0.000	200
Telecommunication & Media	19	54.684	0.000	209
Transportation & Logistic	30	5.500	0.000	55
Utilities	12	16.417	0.000	104
Total	785	153.073	0.000	1,747

Table 1 demonstrates the descriptive statistics for all variables in the study. Based on the results, some of the sampled companies failed to report any e-waste information in their report, as the number of words, number of sentences and quality of e-waste information disclosure recorded 0 for the minimum value. As for the maximum score, each number of words, number of sentences and quality of e-waste information recorded 220 words, nine sentences and a quality score of 4. The quality index shows that the quality is centred between nothing and general qualitative disclosure, whereas the mean score, with 7.39 words, 0.31 sentences and quality of 0.22 suggests low and weak disclosure.

Following the descriptive statistics for the overall companies, this study further analyses the extent and quality of e-waste information disclosure by comparing the 14 industries to identify which industry showed a high commitment to reporting their e-waste information. The results for the number of words are shown in Table 1. From

the table, the highest number of e-waste information disclosure reported are from the telecommunication and media industries (mean=54.684) followed by technology industries (mean=26.500), financial services industries (mean=16.867) and utility industries (mean=16.417). The study also reported that the lowest number of e-waste information disclosures belongs to the health care and real estate investment trust industries; some companies did not report any e-waste information.

Table 2: Descriptive Statistics for Number of Sentences of E-waste Information Disclosure

Industries	N	Mean	Min	Max
Construction	58	0.241	0.000	7
Consumer products & services	164	0.238	0.000	8
Energy	34	0.353	0.000	6
Financial Services	30	0.600	0.000	4
Health Care	11	0.000	0.000	0.000
Industrial Products & Services	227	0.079	0.000	7
Plantation	38	0.158	0.000	3
Property	107	0.215	0.000	5
Real Estate Investment Trust	15	0.000	0.000	0.000
Technology	40	1.250	0.000	8
Telecommunication & Media	19	2.474	0.000	9
Transportation & Logistic	30	0.333	0.000	3
Utilities	12	0.500	0.000	3
Total	785	6.441	0.000	63

Next, Table 2 documented the number of sentences of e-waste disclosed. The results are relatively similar to the number of words. The highest number of sentences was recorded by the telecommunication and media industries (mean=2.474), followed by the technology industries (mean=1.250), financial services industries (mean=0.600) and utilities industries (mean=0.500). Likewise, both industries, which are health care and real estate investment trust, did not disclose any e-waste information resulting in the lowest number of sentences recorded.

Table 3: Descriptive Statistics for Quality of E-waste Information Disclosure

Industries	N	Mean	Min	Max
Construction	58	0.207	0.000	4

Consumer products & services	164	0.146	0.000	4
Energy	34	0.206	0.000	3
Financial Services	30	0.500	0.000	4
Health Care	11	0.000	0.000	0.000
Industrial Products & Services	227	0.053	0.000	4
Plantation	38	0.158	0.000	3
Property	107	0.196	0.000	4
Real Estate Investment Trust	15	0.000	0.000	0.000
Technology	40	0.900	0.000	4
Telecommunication & Media	19	1.211	0.000	4
Transportation & Logistic	30	0.333	0.000	3
Utilities	12	0.750	0.000	4
Total	785	4.660	0.000	41

Lastly, the quality of e-waste information disclosure can be referred to in Table 3. Consistent with the results for the extent of e-waste information disclosure, the telecommunication and media industry reported the highest quality e-waste information disclosure (mean = 1.211), followed by the technology industries (mean = 0.900). Further, the lowest quality of e-waste information disclosure is from the health care industry and real estate investment trust industries.

In reference to the above results, it can be deduced that the telecommunication and media, and technology industries dominated the extent and quality of e-waste information disclosure. This situation happened possibly due to the mandatory requirement by the Bursa Malaysia made to both industries to report the e-waste management activity.

## 5.2 Test of Difference

Table 4: for Extent and Quality of E-waste Information Disclosure

	Industries Difference	N	Mean	Std Dev.
Number of Words	Other Industries	725	5.11	24.084
	Telecommunication and Technology	60	34.98	59.25
Number of Sentences	Other Industries	725	0.2	0.87
	Telecommunication and Technology	60	1.62	2.617
Quality	Other Industries	725	0.16	0.67
	Telecommunication and Technology	60	0.98	1.479

A test of difference was also conducted to analyse the difference in the extent and quality of e-waste information disclosure between industries. In particular, this study compared the two industries (telecommunication and media and technology industries) that required mandatory disclosure of e-waste information with other industries. As expected, Table 4 showed a significant difference in the mean scores for the number of words, sentences, and e-waste reporting quality between telecommunication and technology industries and other industries. In all reporting measures, the former shows a greater extent of telecommunication and technology (34.98 words and 1.62 sentences) and quality (0.98) of reporting than the latter, with 5.11 words, 0.20 sentences, and 0.16 on the quality index.

## 6. Discussion and Conclusion

With the recent changes made by Bursa Malaysia and the Covid-19 aftermath, it is expected that the usage of electrical and electronic devices will rise and eventually dispose of when they reach their end of useful life. This situation follows the question of e-waste management. E-waste that is not properly managed might severely affect human health and the environment. Thus, evaluating commercial organisations' dedication to e-waste management and transparency is crucial. The commitment of companies listed on Bursa Malaysia to disclose e-waste is discussed in this article.

From the findings, the sampled companies only have a mean e-waste reporting score between 7.39 words and 0.31 sentences. The quality seems to be between general qualitative disclosure and non-disclosure (quality index mean score = 0.21). Reflecting these findings with prior studies' findings, the results demonstrated different results from the study by [8], probably due to the different amount of sampling between these studies. Interestingly, the results are comparable with [9] study, which corresponded to the sampled companies' low extent and poor-quality reporting in e-waste information disclosure. This study reports favourable results as the findings show a slight improvement in the extent and quality of disclosure, despite the amount of reporting being still poor. This trend might continue to rise as companies may better understand and improve their commitment to e-waste reporting since companies may need some time to change their practices.

Despite the low extent and poor quality of e-waste information disclosure, this study provides doors for future e-waste management and disclosure research. The results contribute to the body of knowledge on environmental reporting, particularly regarding Malaysian public listed companies' dedication to e-waste management. Authorities, including the DOE, the Malaysian Communication and Multimedia Commission (MCMC) and Bursa Malaysia, would also benefit from the findings that could assist them in enhancing Malaysian companies' handling of e-waste.

This study has several limitations. Firstly, this study only

examines the extent and quality of e-waste information disclosure. As such, future studies could expand the exploration by adding other corporate governance mechanisms like the board of directors, ownership structures and others. Secondly, generalising the results to other years should be viewed with caution as the results from this study only covered one year. This study suggests future studies consider a more extended period or pre and post-study, which perhaps would provide greater support for examining the trend of e-waste information disclosure.

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