International Journal of Business and Management 7 (2): 08-14, 2023
e-ISSN: 2590-3721

DOI: 10.26666/rmp.ijbm.2023.2.2

Female Directors, Sustainability Steering Committee and E-Waste Information Disclosure in Malaysian Technology and Telecommunication Industries

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Received: 18 February 2023; Revised: 28 February 2023; Accepted: 20 March 2023; Published: 30 April 2023

Abstract: The digitalisation era has brought an environmental issue regarding the generation of electrical and electronic waste (e-waste). The global scenario has started questioning how these appliances are taken care of when they reach the end of their useful lives. The advent of these obsolete appliances has created a catastrophe for the health of humans and the environment. Furthermore, business firms in telecommunication and technology industries face the pressure to engage in more severe action towards e-waste management and to report the activities in the annual reports due to their activities which are highly related to the generation of e-waste. In addressing this issue, the study intends to examine the e-waste information disclosure by firms in the two industries. In addition, the study also investigates if the e-waste information disclosure would differ between firms with more female directors and with a sustainability steering committee compared to their counterparts. This study hypothesises that firms with high female directors and a sustainability steering committee will show significantly higher e-waste information disclosure by utilising the virtue ethics theory. Fifty-nine companies of Bursa Malaysia listed firms in the technology and telecommunication industries were taken as samples. The results were consistent with the hypotheses, where firms with a high proportion of female directors and firms with a sustainability steering committee exhibit significantly high e-waste information disclosure compared to their counterparts. The results from this study may give some insights into how business firms address their e-waste management issue and can be significant in achieving the Sustainable Development Goals (SDGs).

Keywords: E-Waste, Disclosure, Sustainable Development Goals, Female Directors, Sustainability Steering Committee

1. Introduction

In this technological era, using electronic and electrical appliances is not seen as sophisticated but rather a need. Technology has taken over many roles in our lives, whether in communication or our routine responsibilities. The advent of technology has created a new environmental issue, especially regarding the devices and appliances used to support the utilisation. There is a question on how the used devices and appliances which have obsolete (after this be referred to as e-waste) should be treated when they reach the end of their useful lives. The Department of Environment (DOE), Malaysia, revealed that e-wastes that are not properly disposed of might create environmental pollution due to the substance inside the e-waste, which is dangerous when exposed to the air [1]. The hazardous substances may permeate the soil and be released into the air in open burning, thus bringing health and environmental hazard to living things surrounding the area [1]. Past studies reveal that humans living near improper e-waste dumping areas exhibit serious health problems, including cancer and organ failure [2-4].

In the global scenario, the generation of e-waste shows an

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increasing trend. In 2019, 53.6 million metric tonnes (Mt) were generated globally, equivalent to 7.3kg per person in that particular year [5]. This figure is estimated to continue to increase, and in the year 2030, the world will be facing 74Mt of e-waste generation, and 110Mt is expected in 2050 [5, 6]. The alarming rates show that something needs to be done by every level of society to curb the risk from rising.

Due to its alarming statistics and horrific effects, awareness of the dangers of e-waste and good practices for managing e-waste should be inculcated in every level of society, including business firms. In Malaysia, business firms, especially those in the technology and telecommunication industries, are urged to perform environmental commitment towards the proper treatment of e-waste and to report their commitments in their annual reports [7]. However, only a few studies have focused on this issue [8-10]. The findings from past studies reveal that several firm characteristics, such as firm size and industry [8] and board characteristics, such as duality [10], exhibit a positive relationship with e-waste information disclosure. The lack of studies in this area has opened opportunities to study the variables that may enhance e-waste information disclosure. Past studies reveal that corporate board with female directors [11-15] and a sustainability steering committee [12, 16-18] shows positive inclination towards firms' environmental commitment. Female directors were found to have more virtue traits (Post et al., 2011), and more coordinated towards achieving sustainability [19]. Meanwhile, a sustainability steering committee within a corporate board ensures proper sustainability strategy formulation and monitoring [16, 17]. Therefore, this study predicts that firms with female directors and a sustainability committee will have more e-waste information disclosure than their equivalents.

The study provides several contributions. Firstly, there is a lack of studies on e-waste information disclosure despite the overwhelming use of electrical and electronic appliances. The findings from this study may provide an early indication of how Malaysian listed organisations have practised e-waste information disclosure in supporting the requirement in the Bursa Malaysia Sustainability Reporting Guide. Secondly, the world aims to achieve the Sustainable Development Goals by 2030. This study's findings may indicate whether Malaysia is close to reaching its goals, especially within the scope of SDG11, which focuses on achieving sustainable cities and communities. Thirdly, the study provides information on the role of female directors and sustainability steering committees in promoting sustainability within business organisations. Achieving 30% of female directors on corporate boards is an aspiration in Malaysia [20]. In 2023, every PLC must have at least one female director on the corporate board [21], as studies show the vital role female directors play in monitoring and control. Meanwhile, the newly launched Malaysian Code on Corporate Governance (MCCG2021) proposes that every publicly listed firm have a designated person to oversee sustainability matters [20]. Therefore, the findings from this study may provide early information on the role played by a sustainability steering committee in shaping a firm's sustainability agenda.

The paper progresses as follows: next is the literature review, followed by the methodology and findings. The paper ends with a discussion and conclusion, followed by suggestions for future research.

2. Literature Review and Development of Hypotheses

2.1. E-Waste

The Basel Convention defines e-waste as "waste from any electrical or electronic equipment including all components, sub-assemblies and consumables, which are part of the product at the time of discarding" [22]. Meanwhile, DOE Malaysia defines e-waste as any "waste from electrical and electronic assemblies containing 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" [1]. E-waste has been categorised as hazardous waste. It contains toxic materials such as mercury, lead, and brominated flame retardants [22]. If not properly disposed of, these toxic components will eventually end up in landfills. Toxic and hazardous chemicals will be generated through open burning or permeating the soil, thus endangering human health and the environment. Improperly managed e-waste results in soil, atmospheric, and aquatic contamination [2, 3], posing a threat to humans, animals, and plants [2]. In humans, exposure to e-waste leads to health problems such as changes in thyroid function, respiratory problems, temperament and behaviour, decreased lung function, DNA damage, and cancer [2, 3].

The Global E-waste Monitor Report by the United Nations shows that global e-waste has increased rapidly [5, 23, 24]. In 2014, e-waste generated globally was documented as much as 41.8 million tonnes. This figure has increased to 53.6 million tonnes in 2019 and is expected to increase to 74.7 million tonnes in the year 2030, or 9kg per person [5], unless some drastic actions are taken to prevent the escalating numbers. Asia is the highest producer of e-waste, with 24.9 million tonnes generated in 2019; from this figure, only about 12% is documented to be appropriately collected and recycled, whereas the others have been dumped in local waste landfills [5]. The latest development on e-waste monitoring activities revealed that there exist transboundary movements of e-waste from higher-income nations to poorer nations. In 2019, about 5.1 million tonnes of e-waste made their way across country borders [6]. From this figure, 3.3 million tonnes were moved in an uncontrolled manner, which involved illegal movements that posed threats to the receiving nations [6].

As a developing country with fast economic growth and massive urbanisation, Malaysia has significantly increased electrical and electronic equipment use. The usage has contributed to e-waste generation in Malaysia, which also shows an alarmingly increasing rate. According to a study, e-waste is one of Malaysia's top six waste streams, representing 4.5% of total waste generation in 2012 [25]. Statistics by the United Nations reveal that in 2014, Malaysia generated 232 kilotonnes of e-waste, or 7.6kg per person [23]. The figures have increased to 364 kilotonnes or 11.1kg per person in 2020 [5]. A substantial increment of 60.3% in industrial e-waste generation has been observed from 2015 to 2017 [26]. To date, the Malaysian Department of Environment (DOE) envisages the total amount of discarded e-waste will increase to 24.5 million units in 2025 [27].

2.2 Factors Affecting E-Waste Information Disclosure

Few studies have examined factors contributing to e-waste information disclosure [8-10]. Thus, the scenario opens a new avenue for research on the motivations for e-waste information disclosure.

The study by Nik Azman and Mohd Salleh [9] investigates if there is a link between financial performance and e-waste information disclosure. The study was conducted among 59 PLCs, where the data for e-waste information disclosure was obtained from the Thompson Reuters database. The results from this study indicate that there is no significant link between the variables under study.

Using a similar method to Nik Azman and Mohd Salleh [9], Selahudin, et al. [10] further investigate if the board of directors' characteristics influence e-waste information disclosure. Underpinned by the agency theory, the study predicts that characteristics such as board diversity, board independence, board meeting, board size, board duality and CSR committee are associated to e-waste information disclosure. However, the study only found board duality significantly associated with the dependent variable, with a negative direction. The results indicate that if the same person holds the role of the Chairman and CEO, there will be less monitoring, thus decreasing e-waste practices and information disclosure [10].

Using a different method, Abd-Mutalib, et al. [8] investigate e-waste information disclosure in Malaysian PLCs, specifically in the technology and telecommunication industries. The reason is that the activities of these two industries are highly correlated to e-waste generation; therefore, these industries are mandated to disclose their e-waste management practices in their annual reports [7]. Ninety-two firms were selected as samples, and the results reveal that firms listed on the Main Board of Bursa Malaysia disclose more than those listed on the Ace Board. Furthermore, e-waste information disclosure was found to be determined by firm size, where larger firms disclose more compared to small firms.

From the discussion above, there is clearly a gap in revealing factors contributing to e-waste information disclosure since very few studies have been found in this area. The current study intends to expand the literature by incorporating female directors and sustainability steering committees as the factors in determining e-waste information disclosure, underpinned by the virtue ethics theory.

2.3 Virtue Ethics Theory

Virtue ethics theory proposes moral perfection, goodness, purity, and excellent character in one's actions or a specific scenario [28]. It projects that how a person will act in a specific situation depends on the virtue of the state of mind at that particular time. Virtue ethics theory involves two factors: (1) the affective virtue; and (2) the intellectual virtue, which are intertwined. Affective virtue means performing the right thing while having happy sentiments, while intellectual virtue means doing the right thing for the right reason or the ability to consider various facts [28].

This theory encourages any individual to perform the right thing, as virtues are directly related to knowledge and relevant reason [29]. Morality encourages doing the right thing and feeling good, and intellectuality encourages doing the right thing for the right reason [30]. The combination of these two characteristics emphasises the development of virtuous character to generate ethically beneficial actions [31].

Past studies identified virtue ethics as a beneficial framework for driving virtuous business activity and promoting ethical company culture. For example, Sankara, et al. [32] emphasise that larger board size is more conducive to ethical disclosure, therefore, will enhance environmental reporting. Furthermore, independent directors will perform more to laws and regulations and give effective leadership [18], therefore, will honestly handle the board's priorities.

In this study, virtue ethics theory predicts the difference in e-waste information disclosure between firms with more female directors and a sustainability steering committee compared to their counterparts. Further discussion can be found in subsequent subsections.

2.4 Female Directors and Environmental Sustainability

The MCCG 2021 stated that at least 30% of the directors in Malaysian PLCs should be female (Securities Commission Malaysia, 2021). The inclusion aims at recognising the role of women in the decision-making process and strengthening leadership as well as the board of directors' effectiveness. Past studies reveal that having female directors on corporate boards enhances firm performance [11, 13] and enhance firms' sustainability agenda [12, 14, 15, 33].

Past studies reveal that gender determines different orientations towards ethics. According to Adams et al. (2015), female directors are more ideal regarding fulfilling stakeholders' expectations than male directors. The ideal

stakeholder-focus of female directors has positively impacted sustainability disclosure. Past studies reveal that the presence of female directors on corporate boards improves the quality of sustainability reporting [34]. Meanwhile [35] found that women directors are more socially responsible, showing that women directors have virtue as a character trait, and this virtuous character can lead to good action. Furthermore, [19] suggest that having more women on boards of directors encourages businesses to do better financially and take more coordinated action toward other aspects of sustainability, such as environmental performance. As a result, female directors positively associate the quality of environmental disclosure and business sustainability measures [17, 33, 36].

Based on the discussion above, it was found that the presence of female directors improves corporate environmental practices and disclosure. Enhanced by the virtue ethics found in the female directors, this study believes that female directors will also exert effort in projecting e-waste information disclosure. Therefore, this study hypothesises:

H_1: E-waste information disclosure would be higher in firms with a high level of female directors.

2.5 Sustainability Steering Committee and Environmental Sustainability

The sustainability steering committee is the board's sub-committee that handles environmental issues. The committee's roles and duties include aiding management with strategy formulation and regularly monitoring sustainability performance [17]. It assists the business in developing, implementing, and systematically reviewing sustainability policies and also analyses its sustainable growth partnerships and relationships and its sustainable growth communication and marketing methods [16].

The MCCG2021 emphasises that the board must appoint committed persons within management to strategically manage sustainability, including incorporating sustainability issues into the company's operations [20]. The recently revised MCCG has empowered environmental reporting within Malaysian PLCs by ensuring that at least one person or a specific member handles environmental issues. This person's name should be disclosed on the PLC's annual report.

Past studies reveal that firms' environmental performance and disclosure would be better with the presence of an environmental committee [16, 18]. The committee works as a catalyst towards good environmental practices by improving employee awareness of the environmental implications of their work and responsibilities to reduce harmful effects [16, 18]. As an expert group, the sustainability steering committee can utilise its knowledge and experience to help firms improve their social and environmental performance [12]. However, a study by Muntaha and Haryono [37] found an insignificant influence on corporate social responsibility reporting.

The previous study shows a mixed findings on the influences of sustainability steering committees towards environmental and environmental reporting. However, in the current study, it is predicted that there will be a significant difference in e-waste information disclosure between firms with and without a sustainability steering committee. This is justified by the virtue ethics theory, which emphasises being morally good effectively and intellectually and is supported by part findings on the positive influence of the committee on environmental disclosure. Therefore, this study hypothesises:

H_2: E-waste information disclosure would be higher in firms with the sustainability steering committee.

3. Methodology

The population of the study is the firms listed on Bursa Malaysia in the technology and telecommunication industries. These firms are selected on the basis that they are required to report their e-waste information as stated in Bursa Malaysia Sustainability Guidelines (Bursa Malaysia, 2018). In 2021, there were 54 technology firms and 17 telecommunication firms, altogether arriving at 77 in the total population.

For sampling, 16 firms in the technology industries and 7 firms from the telecommunication industry are selected as samples using the simple random sampling technique, representing 30% of the population of each industry. The annual reports of these firms in the years 2019-2021 were analysed. The final sample arrives as 59 firms due to the unavailability of the annual reports in specific years. This sample size is appropriate according to [38], who mentioned that sample sizes larger than 30 and less than 500 are appropriate for most research [38].

Three measurements measure E-waste information disclosure; (1) the number of words; (2) the number of sentences; and (3) disclosure quality. For the quality measure, a 5-points quality index is used to capture the data: 0 for non-disclosure, 1 for a general qualitative disclosure, 2 for specific qualitative disclosure, 3 for quantitative disclosure, and 4 for quantitative and qualitative disclosure.

The information on e-waste disclosure is obtained through content analysis on the sampled firms' annual reports. Content analysis is the technique of obtaining data commonly done on historical, written documents [39] to make replicable and valid references from data to their contexts [40]. The measurement and the technique used in this study are consistent with those applied in past sustainability and environmental-related research (Abd-Mutalib, Muhammad Jamil, & Wan Hussin, 2014; Sheikh Abu Bakar et al., 2019).

The percentage of women directors measures female directors variable to the total board of directors. Meanwhile, the sustainability steering committee is measured by a dummy variable, where 1 indicates the existence of a person

or group representing the sustainability steering committee and 0 for vice-versa**.**

4. Findings

The descriptive statistics of the variables under study are depicted in Table 1.

Table 1: Descriptive Statistics

Variable	Min	Max	Mean	SD
EW_EXIST	0.00	1.00	0.42	0.50
NOW	0.00	209	35.58	59.58
NOS	0.00	9.00	1.64	2.63
QLTY	0.00	4.00	1.00	1.49
FD	0.00	50%	18.05%	11.39%
SSC	0.00	1	0.22	0.42
Variables Definition: EW_EXIST = Existence of E-Waste Information Disclosure; NOW = Number of Words; NOS = Number of Sentence; QLTY = Quality of Disclosure; FD = Female Director; SSC = Sustainability Steering Committee				

The results in Table 1 reveal that 42% of the sampled firms project e-waste information disclosure. Among the themes disclosed by the firms are reusing, recycling and reducing e-waste generation. Furthermore, some of the firms also mentioned working closely with vendors to properly dispose of e-waste. Firms only used certified vendors, thus, decreasing the possibility of e-waste being dumped in the local dumping area. The vendors must be certified by the DOE.

The maximum score for such disclosure is 209 words, 9 sentences and a 4-point quality index, with a mean of 35.58 words, 1.64 sentences and a 1-point quality index. The data also reveal that some firms indicate as high as 50% of female directors on the corporate board, while some do not have any, resulting in a mean of 18.05%. Meanwhile, 22% of the sampled firms indicate a sustainability steering committee.

The main objective of this study is to examine if there is a difference in e-waste information disclosure in firms with a high proportion of female directors and with sustainability steering committees compared to their counterparts.

Table 2: T-Test Results for Female Directors

Panel A: Group Statistics				
	Group	N	Mean	Std. Dev.
NOW	Low FD	24	12.88	25.992
	High FD	35	51.14	70.604
NOS	Low FD	24	0.63	1.279
	High FD	35	2.34	3.077
QLTY	Low FD	24	0.29	0.624
	High FD	35	1.49	1.704
Panel B: Independent Samples Test				

	Levene's Test for Equality of Variances	
	F	Sig. (p-val)
NOW	17.486	0.000
NOS	19.871	0.000
QLTY	43.269	0.000
Variables Definition: NOW = Number of Words; NOS = Number of Sentence; QLTY = Quality of Disclosure; FD = Female Director		

In Table 2, the results show a significant difference in the mean scores of the number of words, sentences and the quality of e-waste information disclosure between firms with high and low numbers of female directors. For the number of words, firms with a high number of female directors disclosed 51.14 words, compared to only 12.88 words in firms with a low number of female directors. Meanwhile, for the number of sentences, the difference was 2.34 and 0.63. At the same time, the disclosure quality indicates a difference of 1.49 for firms with high female directors and 0.29 for firms with low female directors. Levene's test of equality of variances indicates that all measures' difference is significant ($p<0.01$).

In Table 3, the results show a significant difference in the mean scores of the number of words, sentences and the quality of e-waste information disclosure between firms with and without sustainability steering committee. For the number of words, firms with sustainability steering committee were found to disclose 72.31 words, 3.08 sentences and with a quality disclosure score of 1.62, compared to only 25.20 words, 1.24 sentences and a quality disclosure of 0.83 in firms without sustainability steering committee. Levene's test of equality of variances indicates that all measures' difference is significant ($p<0.01$) in words and sentence measures while $p<0.10$ in the disclosure quality measure.

Table 3: T-Test Results for Sustainability Steering Committee

Panel A: Group Statistics				
	Group	N	Mean	Std. Dev.
NOW	Without SSC	46	25.20	44.860
	With SSC	13	72.31	87.950
NOS	Without SSC	46	1.24	0.320
	With SSC	13	3.08	0.997
QLTY	Without SSC	46	0.83	0.202
	With SSC	13	1.62	0.488
Panel B: Independent Samples Test				
	Levene's Test for Equality of Variances			
	F		Sig. (p-val)	
NOW	19.259		0.000	
NOS	9.034		0.004	
QLTY	3.068		0.085	
Variables Definition: NOW = Number of Words; NOS = Number of Sentence; QLTY = Quality of Disclosure; SSC = Sustainability Steering Committee				

5. Discussion

The results in the above analysis revealed several significant findings. Firstly, even though Bursa Malaysia has a mandatory requirement for firms in technology and telecommunication industries to reveal their e-waste information disclosure, only 42% have done so. While firms disclose significant disclosures, i.e. 209 words, 9 sentences and 4-point quality index, the mean only indicates 35.58 words, 1.64 sentences and a 1-point quality index. This shows that e-waste information disclosure is there. Still, certain steps need to be taken to see more engagement towards management practices of e-waste being reported in the annual report.

Secondly, firms with a high proportion of female directors on the corporate board show a significantly higher level of e-waste information disclosure than firms with a lower proportion of female directors. This confirms the virtue ethic of female directors, who are more socially responsible and more ideal in fulfilling stakeholders' expectations than their male colleagues.

Thirdly, firms with a sustainability steering committee significantly disclose e-waste information disclosure than firms without such a committee on the corporate board. The findings confirm virtue ethics theory in explaining the role of the sustainability committee to emphasise sustainability-related matters. In turn, it translates to sustainability by having good e-waste management practices and disclosure.

6. Conclusion and Future Research

By utilising the virtue ethics theory, this study investigates whether female directors and sustainability steering committees in the corporate boards strengthen e-waste information disclosure. The results confirm the theory that women who held more ethics and promoted social responsibility and a sustainability steering committee on the corporate board showed greater disclosure of their e-waste practices.

The study is not without limitations. Future studies might want to see the role of more corporate governance indicators with regard to the dependent variable. They may look at the role of ownership structure in promoting e-waste information disclosure.

7. Acknowledgement

We would like to thank the Ministry of Higher Education Malaysia (MOHE) and Universiti Utara Malaysia (UUM) for supporting this study through Fundamental Research Grant Scheme (FRGS/1/2020/SS01/UUM/02/14).

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