THE EXTENT OF ENVIRONMENTAL MANAGEMENT ACCOUNTING (EMA) IMPLEMENTATION AND ENVIRONMENTAL REPORTING (ER) PRACTICES: EVIDENCE FROM MALAYSIAN PUBLIC LISTED COMPANIES

NORSYAHIDA BINTI MOKHTAR

THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

FACULTY OF BUSINESS AND ACCOUNTANCY
UNIVERSITY OF MALAYA
KUALA LUMPUR

2015

UNIVERSITI MALAYA
ORIGINAL LITERARY WORK DECLARATION

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Registration/Matric No. : CHA100003
Name of Degree : Doctor of Philosophy
Title of Project Paper/Research Report/Dissertation/Thesis ("this Work"):
THE EXTENT OF ENVIRONMENTAL MANAGEMENT ACCOUNTING (EMA) IMPLEMENTATION AND ENVIRONMENTAL REPORTING (ER) PRACTICES: EVIDENCE FROM MALAYSIAN PUBLIC LISTED COMPANIES
Field of Study : Environmental Management Accounting

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ABSTRACT

While the pressure of legitimacy was found to greatly influence companies' environmental reporting (ER) practices, being environmentally responsible, however, is not necessarily reflected through positive and descriptive ER. Unless companies begin to truly commit to their business environmental impacts, the issue of incomprehensiveness and incredibility of ER will remain. Given it has been suggested that the deficiency of conventional accounting practices to capture environmental information contributes to the non-disclosure of complete and reliable information, the implementation of environmental management accounting (EMA) is thus necessary. Through EMA implementation, both monetary and physical environmental information can be generated, enabling the integration of environmental information into decision makings as well as reporting practices.

A review of literature suggests that there has been very little research conducted on EMA implementation and the effect its hold on ER practices. Therefore, the present study seeks to examine the extent to which companies implement EMA and whether such implementation is influenced by corporate characteristics. The present study also examines whether the extent of EMA implementation influences the quantity and quality of ER. Using a contingency model, five corporate characteristics, namely, environmental sensitivity of industry, company size, ownership status, environmental management system (EMS) adoption and the proportion of non-executive directors (NEDs) were examined for their associations with the extent of EMA implementation. To explain the association between EMA implementation and quantity and quality of ER, social issue life cycle theory was employed. For consistency purposes, companies were segmented into three social issue life cycle phases: Policy, Learning and

Commitment; with Policy represents the lowest and Commitment the highest extent of EMA implementation.

Data were collected using postal questionnaires and content analysis of corporate annual reports. The results, derived from a sample of 78 Malaysian public listed companies (PLCs), indicate that the extent of EMA implementation was moderate and that more emphasis was placed on environmental cost effectiveness activities. From the social issue life cycle phases standpoint, the majority of companies were in the Learning phase. Additionally, the differences in the extent of EMA implementation were significantly explained by environmental sensitivity of industry and EMS adoption. The results also showed that companies in the Commitment phase reported a greater quantity of ER than those in the Policy and Learning phases. However, no similar effect was observed in the quality of ER. These findings confirm the assertion that a lack of regulation on ER leads to incomprehensiveness and incredibility of ER. In fact, remarks made by the respondents in the questionnaire indicate their inclination towards the development of a comprehensive approach to EMA and refinement of existing ER legislation. This is because, the lack of standardisation makes the measuring and reporting processes very challenging. Despite this however, the regulatory requirement on EMA should be limited to environmentally sensitive industries while others should be on a cost-benefit basis. Taken together, the results of the present study offer important implications for both policymakers and companies. Policymakers will be better informed on the needs of companies pertaining to EMA and ER practices. Companies will be enlightened on the importance of being environmentally responsible and that such practice benefits the companies in many ways, socially and economically.

ABSTRAK

Walaupun tekanan legitimasi mempengaruhi laporan alam sekitar syarikat (ER), tanggungjawab terhadap alam sekitar tidak semestinya dicerminkan melalui laporan berbentuk positif dan deskriptif. Bagi membendung isu ketidaklengkapan ER, komitmen syarikat terhadap impak negatif perniagaan mereka ke atas alam sekitar perlu dipertingkatkan. Tidak seperti konsep perakaunan konvensional yang lazimnya tidak merangkumi aspek alam sekitar atau bukan kewangan, pelaksanaan perakaunan pengurusan alam sekitar (EMA) adalah perlu bagi penjanaan maklumat berkaitan alam sekitar yang relevan. Ini membolehkan pihak syarikat menggunakan maklumat tersebut dalam membuat keputusan dan laporan alam sekitar mereka.

Tinjauan literatur menunjukkan penyelidikan mengenai pelaksanaan EMA dan impak ke atas ER adalah minima. Oleh itu, kajian ini bertujuan mengkaji sejauh mana syarikat-syarikat melaksanakan EMA dan sama ada pelaksanaan tersebut dipengaruhi oleh ciri-ciri korporat. Kajian ini juga mengkaji sama ada tahap pelaksanaan EMA berkaitan dengan kuantiti dan kualiti ER. Menggunakan model *contingency*, lima ciri korporat, iaitu, industri, saiz, status pemilikan, pelaksanaan EMS dan komposisi pengarah bukan eksekutif (NEDs) dikaji sama ada ia mempengaruhi tahap pelaksanaan EMA. Untuk menjelaskan hubungan di antara pelaksanaan EMA dengan kuantiti dan kualiti ER, teori *social issue life cycle* telah diguna pakai. Syarikat-syarikat dibahagikan kepada tiga fasa sosial: *Policy*, *Learning* dan *Commitment*; di mana *Policy* mewakili skor paling rendah dan *Commitment* skor paling tinggi berkaitan pelaksanaan EMA.

Data dikumpul dengan menggunakan soal selidik melalui pos dan analisis kandungan laporan tahunan korporat. Berdasarkan data yang dikumpul dari 78 syarikat awam

Malaysia (PLCs), tahap pelaksanaan EMA didapati sederhana dan penekanan lebih besar diberikan kepada aktiviti alam sekitar berkaitan kos-faedah. Dari sudut fasa social, majoriti syarikat berada di fasa *Learning*. Selain itu, industri dan pelaksanaan EMS secara signifikan berkaitan dengan tahap pelaksanaan EMA. Syarikat-syarikat dalam fasa *Commitment* didapati melaporkan kuantiti ER yang lebih banyak dari syarikat-syarikat dalam fasa *Policy* dan *Learning*. Walau bagaimanapun, tiada interaksi yang signifikan terhadap kualiti ER. Ini menunjukkan bahawa kekurangan polisi atau undang-undang berkaitan ER menyumbang kepada isu ketidaklengkapan ER. Berdasarkan pandangan yang diterima dari responden, pendekatan komprehensif terhadap EMA perlu diperkenalkan dan undang-undang sedia ada perlu dipertingkatkan. Ini kerana, kekangan ini menyebabkan proses penilaian dan pelaporan berkaitan alam sekitar menjadi rumit. Walau bagaimanapun, pelaksanaan EMA harus lebih tertumpu kepada industri yang cenderung memberi impak negatif ke atas alam sekitar, manakala industri yang lain harus bersandarkan kepada kos-faedah. Hasil kajian ini memberi implikasi yang signifikan kepada penggubal dasar dan pihak syarikat. Pembuat dasar akan mempunyai lebih maklumat mengenai keperluan syarikat berkaitan EMA dan ER. Pihak syarikat pula akan dapat melihat bagaimana tanggungjawab terhadap alam sekitar (atau mesra alam) boleh memberi manfaat kepada syarikat dari segi sosial dan ekonomi.

ACKNOWLEDGMENT

In the name of Allah, the Most Gracious and the Most Merciful.

Alhamdulillah, praise be to Allah. With His guidance and will, my journey in pursuit of academic excellence has finally come to an end! This four and a half years journey definitely has been the hardest, mentally, emotionally and physically. However, the continuous support of many individuals has kept me on track and stayed motivated. Thus, I would like to take this opportunity to convey my gratitude to them all in my humble acknowledgment.

I especially wish to express my utmost gratitude to my two respectful supervisors, Dr. Norhayah Zulkifli as my main supervisor and Assoc. Prof. Dr. Ruzita Jusoh as my co-supervisor for their supervision, advice and unflinching encouragement from the very early stage of this journey as well as giving me extraordinary experiences throughout the research works. I simply could not have asked for better supervisors. I am indebted to them more than they know.

I am also deeply grateful to the International Islamic University Malaysia (Kulliyah of Economics and Management Sciences) and Kementerian Pendidikan Malaysia (KPM) for sponsoring my Ph.D. programme.

While working on this thesis, I had the opportunity to present papers at the 24th International Congress on Social and Environmental Accounting Research, University of St. Andrews, Scotland and the Emerging Scholars' Colloquium (at the Seventh Asia Pacific Interdisciplinary Research in Accounting Conference (APIRA)), Kobe, Japan.

This thesis benefited immensely from the helpful and insightful comments from the participants. Also, I extend my special thanks to all the experts who participated capably in the process of validating my research instruments.

Not forgetting, my dear friends, Kak Sharifah and Kak Dalila, thank you for being a great source of support and inspiration.

Finally, to Ayah, Mama, Along, Angah and Adik, thank you very much for always being there for me, listening to my never-ending rants, offering me invaluable advice and most importantly, keeping me sane throughout this entire journey.

Norsyahida Mokhtar

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LIST OF ABBREVIATIONS

ACCA	Association of Chartered Certified Accountants
BPN	Best Practice Notes
BRIC	Brazil, Russia, India and China
BSC	balanced scorecard
CER	Certified Emission Reductions
CFO	Chief Financial Officer
CMS	chemical, mining and smelting
CO_2	carbon dioxide
CP	Cleaner production
CSER	corporate social and environmental reporting
CSR	corporate social responsibility
CSRR	corporate social responsibility reporting
DID	Department of Irrigation and Drainage
DOE	Department of Environment
EIA	Environmental Impact Assessment
EMS	environmental management system
EPI	environmental performance index
ER	environmental reporting
ESCAP	Economic and Social Commissions for Asia and the Pacific
ESG	environmental, social and governance
FCA	full cost accounting
FTSE	Financial Times Stock Exchange
GHG	corporate greenhouse gas
GLC	government-linked company
GLIC	government-linked investment company
GRI	Global Reporting Initiative
GTFS	Green Technology Financing Scheme
HSE	Health, Safety and Environment
IFAC	International Federation of Accountants
IPC	Inter-process communication
ISO	International Organisation for Standardisation

JIT	just-in-time
KMO	Kaiser-Mayer-Olkin
LCA	life cycle cost analysis
MAR	missing at random
MAS	management accounting system
MaSRA	Malaysia Sustainability Reporting Awards
MCAR	missing completely at random
MEMA	monetary environmental management accounting
METI	Ministry of Economy, Trade and Industry
MFCA	Material flow cost accounting
MIA	Malaysian Institute of Accountants
MICPA	Malaysian Institute of Certified Public Accountants
MIM	Malaysian Institute of Management
ML	maximum-likelihood
MNAR	missing not at random
MOE	Ministry of Environment
NACRA	National Annual Corporate Report Awards
NED	non-executive director
NEM	New Economic Model
NIC	newly industrialised countries
NPE	National Policy on the Environment
NSE	Nairobi Stock Exchange
OECD	Organisation for Economic Co-operation and Development
PCG	Putrajaya Committee on GLC High Performance
PCV	positive crankcase ventilation
PEMA	physical environmental management accounting
PLC	public listed company
PNED	proportion of non-executive directors
REIT	Real Estate Investment Trusts
RM	Ringgit Malaysia (currency)
RSPO	Roundtable Sustainable Palm Oil
R&D	research and development
SD	standard deviation
TQM	total quality management
QTER	quantity of environmental reporting

QLER	quality of environmental reporting
UNDSD	United Nations Division for Sustainable Development
UN-REDD	United Nations Collaborative Initiative on Reducing Emissions from Deforestation and Forest Degradation
VIF	variance inflation factors
WWF	World Wildlife Fund
ZRE	standardised residual

CHAPTER ONE

INTRODUCTION

1.0 Introduction

> When the last tree has been cut down, the last fish caught, the last river poisoned, only then will we realise that one cannot eat money.
>
> − Native American proverb

The abovementioned proverb truly reflects the entire focus of the present study. Over the years, environmental issues such as pollution, deforestation, erosion and climate change have challenged the society with ever regular frequency. These issues not only undermine the quality of human life but also pose grave threats to global sustainability. Industrialisation, through mass production and widespread use of heavy machines, has been established as one of the major contributors to environmental degradation. Along with population growth, demands for infrastructures such as housing, utilities, buildings and foods are fast escalating. By any measure, the consumption of raw materials, energy, water and natural resources is enormous in order to meet these demands. Construction activities, for example, consume 3 billion tonnes of raw materials or 40% of total global use per year (Pulselli et al., 2007). As the consumption of these resources continues to accelerate, more and more wastes and emissions are being generated every day, putting the society at risk for daily pollution exposure. Exposure to air pollutants, for example, can cause respiratory illness and other health problems which can be deadly, especially in children and the elderly. In 2012 alone, nearly 7 million premature deaths were attributable to air pollution (World Health Organisation, 2014).

Furthermore, over the past half century, more than half of the world's rainforests were deforested for infrastructure developments, urbanisation, agriculture expansion and logging. Statistically, the World Wildlife Fund (WWF)[1] indicates that the world is losing its rainforests at a rate of 36 football fields per minute. Deforestation also contributes nearly 15% of global greenhouse gas emissions. The accumulation of greenhouse gases leads to warmer weather. The warmer it gets, the higher the risk of climate change. High frequency of droughts, floods, hurricanes, and rising sea level are some of the manifestations of extreme climate changes. These disturbances impair the productivity of agriculture, livestock and fisheries, resulting in disruptions to the global food resources in the long run. Meanwhile, the loss of forests cover especially on steep terrains increases the risk of soil erosion, sedimentation and landslides (Bathurst et al., 2007).

Recognising the adverse impact of business activities on the environment, the concept of sustainable development was introduced in the business world decades ago (Association of Chartered Certified Accountants [ACCA], 2003a; International Federation of Accountants [IFAC], 2005; United Nations Environment Programme, 2007), calling for companies to balance their profit orientation with the sensitivity towards the environment. However, because of the inextricable links between industrialisation and economic growth, there appears to be a tension between profit-making intention and environmental efforts (Wilbanks et al., 2007). Oftentimes, such a pragmatic trade-off leads to companies' sensitivity towards the environment being less prioritised (Adams, 2009). These arguments, to a certain extent, are fortified by the dominance of environmental issues in China and India. China and India are both

[1] *Deforestation*. Retrieved on June 21, 2013 from https://www.worldwildlife.org/threats/deforestation

developing countries[2] where industrial sector contributes substantially to their economic growth. They are also among the fastest-growing BRIC[3] economies (Organisation for Economic Co-operation and Development [OECD], 2007). Despite the impressive growth rates, environmental problems are exacerbating as quickly as their economy. According to recent estimates, China and India are among the top six emitting countries in the world (International Energy Agency, 2013; Olivier et al., 2013). It was also reported that air pollution in China would reach hazardous if no immediate measures taken to combat the problem. Nonetheless, environmental issues are not only salient to developing countries. Developed countries, such as the United States and Japan, to a name a few, are also facing various forms of environmental problems relating to industrialisation. Apparently, it is the lack of proper initiatives taken by developing countries to curb with the rapid growth in environmental issues, China would the best example, that has shifted the international concern more on developing countries' environmental commitments (International Energy Agency, 2013).

In Malaysia, environmental issues are not without interest. The rapid economic growth and structural transformation experienced by Malaysia since the 1970s have exacerbated many environmental problems. Until 2010, Malaysia has lost almost 8.6% of its natural forest[4]. This rate is expected to increase considering illegal logging and uncontrolled expansion of rubber and oil palm plantations have become more widespread over the past few years, including in the permanent forest reserve (New Straits Times, 2012; The Star Online, 2013a, 2014b). In addition, the deforestation rate in Sarawak – one of the states in East Malaysia which covers the largest rainforest in Malaysia, is accelerating

[2] As of 2011, China and India became newly industrialised countries (NIC). NIC is a term used to classify companies with the level of economy ranks between the developing and developed countries.
[3] BRIC stands for Brazil, Russia, India and China. The BRIC's economies represent more than one-fourth of world GDP and rank among the top ten largest world economies (OECD, 2007).
[4] The UN-REDD Programme: United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation (REDD) in developing countries. Retrieved on August 20, 2013 from http://www.unredd.org/Regional Activities_ AsiaPacific_New/tabid/104258/AsiaPacific_Malaysia/tabid/106577/Default.aspx

3.5 times as much as that for the entire Asia (SarVision, 2011). Deforestation increases the risk of flash floods, especially during the Northwest Monsoon (from November to March) that brings heavy rainfall. According to the Department of Irrigation and Drainage (DID), about 29,000 sq. km or 9% of the total land area in Malaysia is flood-prone, affecting up to 4.82 million people annually with an estimated annual loss of RM915 million. Deforestation also has caused severe siltation of Malaysian rivers and water catchment areas. In the first quarter of 2014, following the unexpected long dry season, the imminent water rationing in several cities in Kuala Lumpur, Selangor, Negeri Sembilan and Johor have led to serious questioning of the sustainability of the country's water resources. This issue seems to remain outstanding until the end of the year.

Another major concern to the country is the improper waste management. Media reports on illegal dumping of industrial and construction wastes on public lands are fast becoming a norm. Court case statistics released by the Department of Environment (DOE) show that within 2008 to 2013, open-burning, black smoke emissions and industrial effluents are among the major environmental offences committed by Malaysian companies. In addition, more than 40% of the rivers in Malaysia have been classified as polluted or slightly polluted by the DOE, with the major pollutants emanated from industrial wastes and sewage treatment plants. In other cases, the overuse of pesticides and wastewater from agricultural activities in Cameron Highlands – the Malaysia's agriculture heartland, have greatly contributed to river pollution in the area (Gasim et al., 2009; Saadati et al., 2012). In October of 2013, following intense downpours, the sudden increase in water level of the Ringlet reservoir due to sedimentation from illegal land clearing activities and solid wastes dumping, has caused a mud flood. At least three people were killed in the incident (New Straits Time, 2013).

To strike a balance between economic developments and environmental protection, numerous efforts have been initiated by the Malaysian government. On the regulatory side, one example is the institution of the federal environmental statue of Environmental Quality Act (EQA) 1974. The Department of Environment (DOE)[5] was established to execute the policies or enforcements under this Act. As far as government-linked companies (GLCs) are concerned, the introduction of the Silver Book in 2005 as part of the GLC Transformation Programs[6] depicts the government effort in encouraging GLCs to embark on corporate social responsibility (CSR) activities. The Book sets guidelines on how GLCs can proactively contribute to the society. Later in 2012, the Silver Book Best Practice Notes (BPN) was published, providing practical guidance and case studies for developing and implementing robust CSR programmes (Putrajaya Committee on GLC High Performance [PCG], 2013).

A great deal of environmental incentives has also been introduced to further encourage companies' involvement in environmentally responsible business activities. Some of the examples are, the introduction of a series of tax incentives on environmental protection which include recycling, purchase of biological equipment, biomass utilisation and energy conservation; and the allocation of a fund totalling RM1.5 billion under the Green Technology Finance Scheme (GTFS) to provide financial assistance to companies that supply and utilise green technology. Besides the incentives, a 'Green Court' or 'Environmental Court' has been established in 2012 to address the growing court cases involving industries' environmental activities. The court aims to ensure efficient administration and disposal of environmental cases.

[5] DOE was formerly known as the Environmental Department.
[6] GLC Transformation Program aims to improve GLCs performance as part of the government's effort in achieving the Vision 2020, which is to be a fully developed country (PCG, 2006).

Companies are facing unprecedented pressures to maintain their business survival, environmentally, socially and economically. In this regard, they are more likely to respond to the regulators and public pertaining to their environmental performance once the groups start to voice out their concern (Wilmshurst and Frost, 2000; Nik Ahmad and Sulaiman, 2004). Previous literature suggests that under increased public or regulatory scrutiny, companies tend to report more of their environmental information (Buhr, 1998; Patten and Trompeter, 2003; Zainal et al., 2013). In the context of Malaysia, despite the number of companies engaging in ER is gradually increasing, the practice is still at infancy (Ahmad et al., 2003; ACCA, 2003b; Nik Ahmad and Sulaiman, 2004; Yusoff et al., 2007; Alrazi et al., 2009; ACCA, 2010a; 2010b; Buniamin, 2010). Moreover, amidst the CSR dimensions: market place, community, work place and environment; environmental information was the least information reported by companies (Thompson and Zakaria, 2004; Bursa Malaysia, 2007; Amran and Susela, 2008; Said et al., 2009; Mustaruddin et al., 2010; Wan Abdul Rahman et al., 2011; Zainal et al., 2013). From 2007 onwards, Corporate Social Responsibility Reporting (CSRR) has been made mandatory to all Malaysian public listed companies (PLCs) as a means of enhancing companies' CSRR practices. The mandate requires PLCs to report their CSR activities in the annual reports. Despite the fact that the mandate fall short of specific reporting requirements (Alrazi et al., 2009; Othman and Ameer, 2010; Zainal et al., 2013), it is certainly a step to the right direction for a positive CSRR development including ER. In addition, the enthusiasm of Bursa Malaysia for further growth of CSRR is manifested in its plan to introduce Environmental, Social and Governance (ESG)[7] Index by the end of 2014 (The Star Online, 2014a).

[7] Environmental, Social and Governance (ESG) provides additional relevant information to investors concerning the environment, social and governance which enable them to better assess risks and opportunities (Bassen and Kovacs, 2008).

In the absence of generally accepted accounting standards on ER, the incomparability, incompleteness and incredibility of ER has long been a topical issue (Adams, 2004; Owen, 2008; Othman and Ameer, 2010; Bouten et al., 2011; Gillet, 2012). As companies are allowed to exercise discretionary reporting vis-à-vis their environmental information, the reports vary from company to company (Othman and Ameer, 2010). Moreover, prior literature demonstrates that companies tend to report positive and narrative environmental information (Hackston and Milne, 1996; Ahmad et al., 2003; Ferreira, 2004; Nik Ahmad and Sulaiman, 2004; Jaffar, 2006; Yusoff et al., 2007; Alrazi et al., 2009; Buniamin, 2010). In light of legitimacy theory, companies are more likely to act within the acceptable norms and perceptions of the society to avoid any negative public attentions or compelling interests on their business activities (Wilmshurst and Frost, 2000; Campbell et al., 2003; Deegan, 2006b; Cho and Patten, 2007). That is, in an attempt to legitimise their business activities, ER is often used as a 'public relations exercise' (Ferreira, 2004). Such a position is also reinforced by the contention that many companies embarking in ER or CSRR in general, thinking that it is the right thing to do, with a lack of focus on measuring their environmental undertakings (Epstein and Roy, 2003).

With such disclosure, occurring as it does in the corporate annual report, not many companies reported specific environmental information concerning the impacts of their business activities particularly on the physical and monetary environmental-related information (see Hackston and Milne, 1996; Ahmad et al., 2003; Ferreira, 2004; Nik Ahmad and Sulaiman, 2004; Jaffar, 2006; Yusoff et al., 2007; Alrazi et al., 2009; Buniamin, 2010; Bouten et al., 2011). Physical environmental information can be defined as the information related to the flow of energy, water, materials and wastes (e.g. the volume of waste water discharged, total volume of energy consumed and volume of

materials recycled), while monetary environmental information is the monetised amount of these information (IFAC, 2005). Within the limited number of companies reporting physical environmental information, the monetary environmental information is considerably lacking (Sulaiman and Nik Ahmad, 2006).

In providing the stakeholders the sources of information that may support their economic decision making, the incompleteness and incomparability of environmental information reported may take its toll on the credibility of ER as a platform to report companies' environmental performance. It is difficult for the stakeholders to adequately evaluate companies' environmental performance if the information reported is varied and not quantified. Indeed, such concern is reiterated by a significant growth in the stakeholders' demand for companies to report their environmental performance in the corporate annual report (Deegan and Rankin, 1997; Murray et al., 2006; De Villiers and Van Staden, 2010). In a recent study conducted in Malaysia which sought to examine the usefulness of environmental information among fund managers, it was found that environmental information is perceived as significant in lending decisions (Mohd Said et al., 2013). Similarly, Allet (2014) found that microfinance institutions began to screen loans according to environmental criteria and offer microcredit to support green technologies.

Because conventional accounting tools provide limited support to the generation of environmental information, environmental management accounting (EMA) has been initiated more than two decades ago, to meet the needs for companies to satisfy their stakeholders who require environmental-related information (Burritt et al., 2002; Schaltegger et al., 2003; Burritt, 2004). Through EMA, companies are able to measure physical and monetary environmental information beyond the conventional perspective

which tends to lump environmental costs into the overhead costs (Burritt et al., 2002; Bennett et al., 2002a; Schaltegger et al., 2003; Burritt, 2004; IFAC, 2005). The recent development of EMA framework further emphasises the fulfilment of internal as well as external users' demands for environmental information (Burritt and Saka, 2006).

The significance of accounting in addressing environmental issues has been manifested in various developments related to environmental accounting[8], making it the most evolved form of sustainability accounting[9] (Lamberton, 2005). Inter alia, environmental accounting has been considered as an academic subject to be taught in the universities (Deegan, 2002). Embedding the goal of sustainable development into education offers an opportunity to nurture students as 'rational economic person' and equips them with competencies to thrive in the globalised world as well as contribute to the society (Deegan, 2013). In a related point, several European countries, for example, Denmark, Sweden, Norway, Holland, Spain and Portugal have configured environmental accounting as mandatory, requiring companies to report environmental information in their financial statements to enhance the credibility of ER (Lodhia, 2003; Criado-Jimenez et al., 2008). In addition, the European Commission in its revised reporting requirements in 2003, requires European Union (EU) member states to report their "Total Current Expenditure on Environmental Protection" which include waste and emissions treatment cost, prevention and other environmental management, and environmental research and development (IFAC, 2005). In Japan, besides the publication of the *Environmental Management Accounting (EMA) Workbook* by the Ministry of Economy, Trade and Industry (METI) which centred upon the internal environmental management practices, the Ministry of Environment (MOE) introduced an environmental accounting guideline to encourage companies to report their

[8] Environmental accounting in general is the accountants' contribution towards environmental sensitivity in organisations (Lodhia, 2003). It provides monetary, physical and qualitative information related to the business environmental impacts and their financial consequences which use to support internal and external decision making, reporting and accountability (Schaltegger et al., 2003).
[9] Sustainability accounting includes both social and environmental accounting (Tilt, 2010).

environmental accounting information (Kokubu and Nakajima, 2004; Kokubu and Nashioka, 2008). On the voluntary reporting guideline side, the Global Reporting Initiative (GRI) has integrated the financial aspect into its framework to promote the reporting of an organisation's sustainability performance (Global Reporting Initiative [GRI], 2011).

Following the trend, Malaysia, through the DOE, has also initiated various environmental management practices. Of these, industrial or manufacturing companies are required to declare their scheduled waste management and perform periodic air pollution and emissions performance monitoring. In addition, prior to embarking any development, the developers are compelled to submit an Environmental Impact Assessment (EIA) and that all EIA projects must perform environmental audit.

With the constant media coverage on companies' irresponsible business activities, changing public perceptions can become a real business expense in the future. Companies, in turn, really need to step up their environmental undertakings, including implementing EMA to measure and manage their environmental performance, as well as to extend the existing ER practice to incorporate quantified environmental information. After all, having no clear indication on the environmental performance, the sensitivity of companies towards the environment may not necessarily improve.

1.1 Problem Statement

In a constantly changing business environment, the ability of companies to adapt to the changes is essential for their survival. Consequently, adapting to the new environment requires companies to have effective or sophisticated management accounting systems (MASs) to facilitate the decision making and control processes to improve companies'

performance (Hoque and James, 2000; Chenhall, 2003; Tuanmat and Smith, 2011). This includes EMA implementation to support companies' environmental strategies, given there is increasing pressure for companies to take a more holistic approach to environmental management (Gray, 2001; Hopwood, 2009).

Based on contingency theory argument, there is no universally appropriate MAS applicable to all companies where such implementation will largely depend on the circumstances surrounding the companies (Otley, 1980). These include company size, environmental uncertainty, production technology, corporate strategy and market environment (Chenhall, 2003; Hoque, 2004; Abdel-Kader and Luther, 2008). While contingency-based research has been greatly elaborated in the field of management accounting, its application in environmental accounting research is still limited (Bouma and Van der Veen, 2002; Qian et al., 2011; Christ and Burritt, 2013).

Furthermore, a considerable number of previous ER research have implicitly assumed that there is an interplay between EMA and ER practices by suggesting companies that engage in environmental activities[10] should report information related to such activities (see Tilt, 2006). In spite of the increasing interest, very little research has empirically examined the association between EMA and ER (Frost and Seamer, 2002; Tilt, 2006; Ferreira et al., 2010). More importantly, there has been not much research conducted on companies' EMA practices (Bouma and Van der Veen, 2002; Ferreira et al., 2010; Qian et al., 2011; Christ and Burritt, 2013).

In terms of the source of information, EMA as the internal management accounting practices are much less visible in contrast to ER (Hopwood et al., 2010). ER, on the

[10] Environmental activities relate to the environmental operations and strategies (Tilt, 2006) which generally are the internal environmental management practices. These include, but not limited to: the implementation of an environmental management system (EMS), EMA, the establishment of environmental department and environmental audit.

other hand, is produced externally and easily accessible via corporate annual reports, corporate website, stand-alone reports and other mediums of reporting. Perhaps due to the information accessibility, previous research has largely confined its attention to companies' ER practices in understanding corporate responses to environmental change (Tilt, 2006). While accepting the argument that content analysis of ER enables the researchers to understand corporate environmental strategies, the examination of internal environmental management practices that support the reporting is equally significant. Moreover, given that conventional accounting practices only emphasis on describing economic events and that do not provide appropriate measures of environmental information[11], EMA represents the cornerstone of a holistic MAS that assists the generation of relevant environmental information for internal and external purposes.

Since ER has not been configured as a generally accepted accounting standard, the role of accounting in companies' environmental undertakings appears to be limited (Lodhia, 2003; Hopwood, 2009; Collins et al., 2011; Deegan, 2013). Very little emphasis has been placed on reporting quantified environmental information to the public domain (Hackston and Milne, 1996; Ahmad et al., 2003; Ferreira, 2004; Nik Ahmad and Sulaiman, 2004; Jaffar, 2006; Yusoff et al., 2007; Alrazi et al., 2009; Buniamin, 2010; Bouten et al., 2011). However, there is also an argument over the refusal of companies to report the EMA information, with access controlled by the reporting companies. In particular, the dissemination of quantified environmental information can enhance the visibility of companies' environmental activities, which is seen as a treat to their legitimacy (Hopwood, 2009). This particular perspective is closely related to legitimacy theory which believes that companies have a tendency to fabricate their environmental

[11] This may explain why social and environmental accounting began with CSR in 1970s and followed by the emergence of EMA 20 years later.

activities to appear legitimate (Ferreira, 2004; Sulaiman and Nik Ahmad, 2006; Hopwood, 2009). It is observed that the generation of EMA information was found to facilitate the internal decision-making rather than reporting purposes (Masanet-Llodra, 2006). Similarly, to attain legitimacy, companies engaged in concealment strategies such as window dressing and reporting positive information although there is a stipulation requiring companies to report environmental information in the financial statements (Criado-Jimenez et al., 2008). In another study of the adoption of pre-mandatory accounting standard on ER, Monteiro and Aibar-Guzman (2010) found that such adoption positively influenced the extent of ER, but the overall reporting was low and that information of environmental performance indicators was very minimal.

The studies outlined above present an ambiguous path of companies' environmental strategy, where it is not clear whether companies reporting environmental information to reflect their environmental performance or simply oriented towards legitimacy (Hopwood, 2009). From a social issue life cycle theory perspective, the element of an obligation to report environmental information ought to be present when companies integrate environmental information into their business decision makings. The theory suggests that an environmental issue progresses from insignificant to significant (Zyglidopoulos, 2003) and that companies' responsiveness towards the issue can be segmented into three phases: Policy, Learning and Commitment (Nasi et al., 1997). Using Ackerman's (1975) social issue life cycle model, Nasi et al. (1997) assert that the solution to an environmental issue occurs in the last phase – Commitment, and it is manifested by the integration of environmental information into business decision-making. Usually, such an integration will result in the dissemination of company's environmental performance to the stakeholders as part of its commitment to environmental responsibility (Nasi et al., 1997).

1.2 Objectives of the Study

Motivated by the relatively sparse empirical research on EMA in Malaysia and most importantly, responding to calls for more research investigating the association between EMA implementation and external environmental practices (Frost and Seamer, 2002; Tilt, 2006; Ferreira et al., 2010; Christ and Burritt, 2013), the present study seeks to:

i. to examine the extent to which Malaysian PLCs implement EMA;

ii. to examine the influence of corporate characteristics (i.e. contingent variables): environmental sensitivity of industry, company size, ownership status, environmental management system (EMS) adoption and the proportion of non-executive directors (NEDs); on the extent of EMA implementation; and

iii. to investigate whether the extent of EMA implementation influences the quantity and quality of ER of Malaysian PLCs, from a social issue life cycle theory perspective.

1.3 Research Questions

To meet the above objectives, the following research questions have been developed:

RQ1: To what extent do Malaysian PLCs implement EMA?

RQ2: Do corporate characteristics influence the extent of EMA implementation in Malaysian PLCs?

RQ3: To what extent do Malaysian PLCs report their environmental information?

RQ4: Does the extent of EMA implementation influence the quantity and quality of ER? Are there significant differences in the quantity and quality of ER between companies in the Policy, Learning and Commitment phases?

1.4 Research Scope and Method

The present study focuses on Malaysian companies listed on the Main Market of Bursa Malaysia. 'Main Market' is a new term used to denote the combination of Malaysia's Main Board and Second Board into a single board. It is a cross-sectional and a single-country study examining the extent of EMA implementation as well as its association with ER practices.

To achieve the objectives of the present study, postal questionnaires and content analysis of corporate annual reports were employed for data collection. Postal questionnaires were mailed to the Chief Financial Officers (CFOs)/Finance Directors to assess the extent of companies' EMA implementation. Meanwhile, content analysis of corporate annual reports of the responding companies was carried out to measure the quantity and quality of ER. The annual report for year-ended 2011 was chosen as that was the latest year of annual reports available at the period of study. Furthermore, the year represented the post-effect after the regulation of CSRR in 2007.

The paper relies on contingency theory to argue that corporate characteristics determine the extent of EMA implementation. The set of potential contingency variables consists of five corporate characteristics, namely, environmentally sensitivity of industry, company size, ownership status, EMS adoption and the proportion of NEDs. In attempting to provide an answer as whether the extent of EMA implementation is associated with ER practices, social issue life cycle theory provides the theoretical underpinnings.

1.5 Contributions and Significance of the Study

There are several contributions that the present study may contribute to the body of knowledge, theoretically and practically. Firstly, EMA research in Malaysia as well as internationally is lacking, but emerging. A review of literature also suggests that much of the past research has been concentrated on the EMA implementation among manufacturing companies (e.g. Kokubu and Nashioka, 2008; Jalaludin et al., 2011) and those in environmentally sensitive industries (e.g. Bartolomeo et al., 2000; Burritt and Saka, 2006; Burritt et al., 2009; Ferreira et al., 2010; Qian et al., 2011). To add to the existing literature, an understanding of companies' environmental responsiveness relating to EMA implementation among a wide range of industries would be of significance to reflect the uses or benefits of EMA in enhancing companies' environmental undertakings.

Secondly, there is a relatively limited area of research that examines the association between EMA implementation and ER practices (Frost and Seamer, 2002; Tilt, 2006; Ferreira et al., 2010; Christ and Burritt, 2013). To the best of the researcher's knowledge, it appears that this issue is yet to be empirically explored in the Malaysian context. Therefore, the present study adds to the literature by providing evidence on the extent of companies' EMA implementation and its association with ER practices in developing countries generally and Malaysia particularly. In addition, given CSRR is now mandatory in Malaysia, should the findings indicate no or weak association, it can be used to inform the government as well as the policymakers in refining the existing CSRR framework. Perhaps, not only by providing the guideline, the establishment of measurement and reporting instruments specifically for environmental issues, as a way to assist companies to report on their environmental performance, could be contemplated.

Thirdly, in investigating the association between contingent variables and the extent of EMA implementation, the present study extends previous research by incorporating new contingent variables: ownership status and the proportion of NEDs; in the contingency theory framework. The inclusion of ownership status (i.e. GLCs and non-GLCs) is significant considering that GLCs are prominent in the context of Malaysia. The Malaysian Government has a direct controlling stake on GLCs (PCG, 2006). GLCs are the main providers of the core strategic utilities and services of Malaysia including electricity (e.g. Tenaga Nasional Bhd.), telecommunication (e.g. Telekom Malaysia, Axiata Bhd.) banking and financial services (e.g. Malayan Banking Bhd., Commerce International Merchant Bankers Bhd.), and airline (e.g. Malaysia Airlines System). Furthermore, GLCs constitutes 36% and 54% respectively of the market capitalization of Bursa Malaysia and the benchmark Kuala Lumpur Composite Index[12]. Given such an ownership structure, the results may provide evidence on the effect of ownership status in influencing the implementation of internal environmental management practices. The results may also exhibit the extent to which GLCs uphold environmental sustainability and accord to the government's vision.

In light of the immense changes impacting global businesses coupled with several incidents of corporate failures, the role of NEDs widen to be considered as an essential component of the corporate governance (Malaysian Code on Corporate Governance, 2000). Therefore, a significant association between NEDs and the extent of companies' EMA implementation may highlight a new perspective on the role of NEDs in influencing companies' change efforts especially on the environmental aspect.

[12] Khazanah Nasional Berhad. Retrieved on March 13, 2012 from http://www.khazanah.com.my/faq.htm#ques8

Fourthly, in determining companies' social issue life cycle phases, the present study employs a self-developed measurement. This may add to the literature by offering a base for social issue life cycle phases' classification.

Fifthly, the evaluation of quantity and quality of disclosure without doubt is common in CSRR and ER research to better understand companies' reporting practices. As the objective of the evaluation remains, the measurement of quality in the present study aims to address the issue of non-disclosure of EMA information. More specifically, in justifying the association between EMA implementation and ER practices, relying on the quantity of disclosure per se may not well depict such association. This is because, a high quantity of environmental disclosure does not necessary associate with high quality of reporting (Gamble et al., 1995; Walden and Stagliano, 2003; Alrazi et al., 2009). Therefore, the examination of the quality of environmental disclosure will provide clearer justification on the influence of EMA implementation on ER practices, that is, through the disclosure of quantified environmental information.

Lastly, the present study employs social issue life cycle theory in examining the association between the extent of EMA implementation and ER practices. The discussion may offer a significant contribution in considering the relative dearth of literature in the environmental accounting field conducted from the perceptive of the theory, in comparison to legitimacy theory and stakeholder theory. Moreover, the discussion on companies' current environmental practices may provide an indication on the degree of Malaysian PLCs' environmental commitment after the CSRR mandate. In many ways, the perceptions of management on the importance of EMA in facilitating the generation of environmental information for disclosure purposes can be used to

explore the preferences of the people in the industry which could have a significant implication on future policy making.

1.6 Organisation of Chapters

The remainder of this study proceeds as follows:

Chapter Two: Literature Review – This chapter reviews prior literature in the areas of interest, namely, EMA and ER. It is clearly understood that it is impossible to provide an exhaustive review of all prior studies ever conducted on the area of ER and EMA, as well as those that provided a discussion on contingency theory as well as social issue life cycle theory. Thus, with this in mind, the aims of this chapter are, first, to summarise topical findings of what has been academically researched of late related to the scope of the study, and second, to critically analyse the problems or arguments ascended in the reviewed literatures.

Chapter Three: Theoretical Framework and Hypotheses Development – This chapter discusses the theoretical framework as well as the development of hypotheses. Drawing upon contingency theory and social issue life cycle theory, several hypotheses are developed, incorporating the perceptual variables derived from the reviewed literature.

Chapter Four: Research Methods – This chapter provides a discussion on the epistemological position of the researcher from which such a standpoint has shaped the research design of the present study. Grounded by a positivistic stance, a quantitative research approach, via postal questionnaires and content analysis of corporate annual reports, is opted for data collection. Issues related to each method are also deliberated in this chapter.

Chapter Five: Findings – This chapter offers the findings of the study, which are segmented into four main sections. The first section provides the descriptive results. In this section, response rate, the characteristics of the sample companies, the extent of EMA implementation and the content analysis of corporate annual reports on the quantity and quality of ER are presented. In the second section, the results of ordinal logistic regression analysis with regard to factors influencing the extent of EMA implementation are offered. The third section presents the analysis for the association between EMA implementation and ER practices. For this particular analysis, data collected from both questionnaires and content analysis of corporate annual reports are utilised. The final section delivers the comments received from the managements on the issue of EMA and ER. However, it must be emphasised here that the perceptions are only used to support the quantitative analysis.

Chapter Six: Discussion – This chapter discusses in detail the findings of the study by incorporating the results of other studies of a similar nature.

Chapter Seven: Conclusions – This chapter concludes the thesis by summarising the objectives, main findings and contributions of the present study. The limitations of the study as well as suggestions for future research are also deliberated in this final chapter.

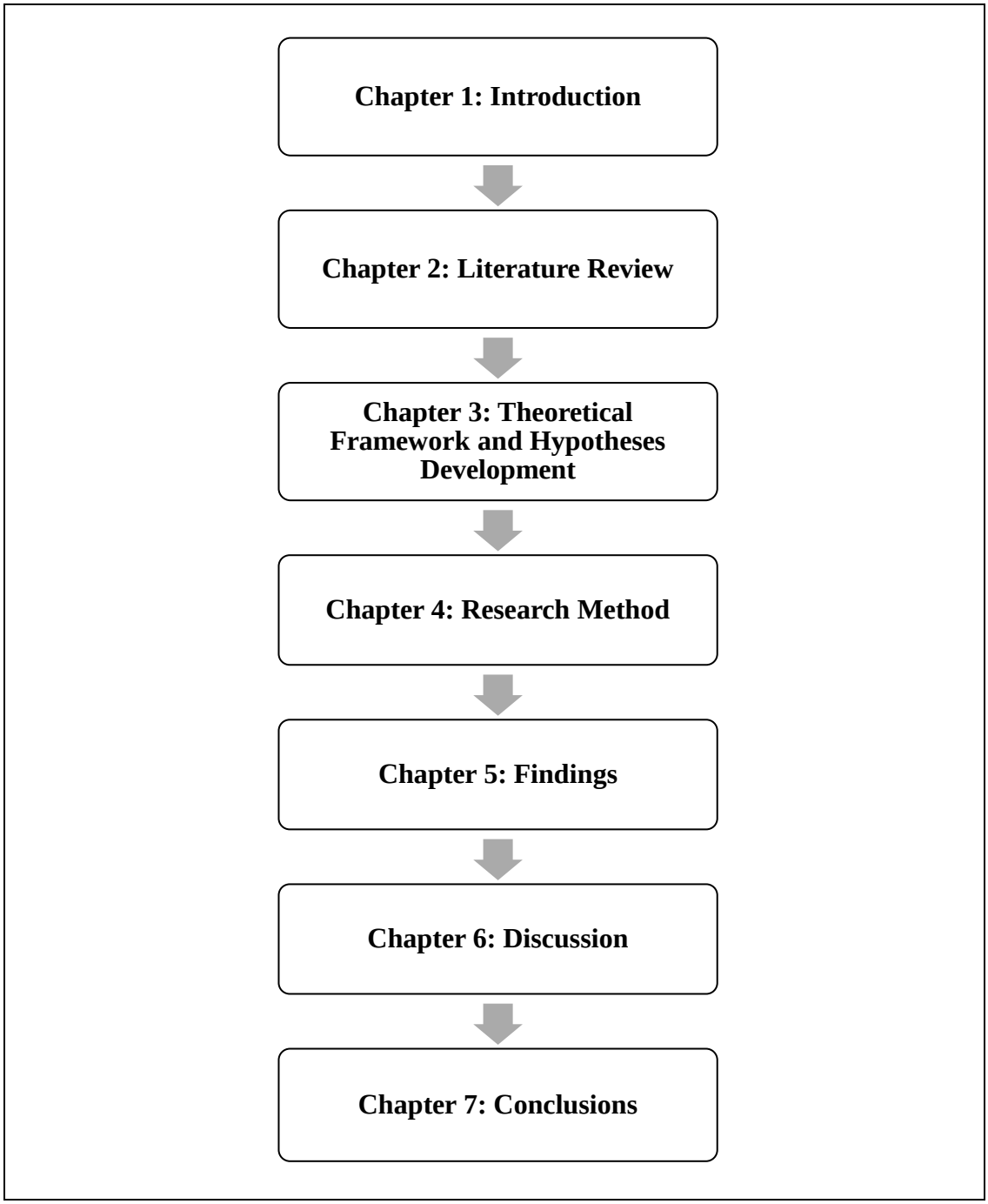


Figure 1.1: Overview of the Thesis

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The preceding chapter discussed the background, objectives and contributions of the study. The current chapter on the other hand, contains a review of literature on the areas of concern, specifically, EMA and ER. It summarises and discusses topical findings of what has been academically researched of late and analyses the problems and arguments ascended in the reviewed literature.

The chapter is segmented into three main sections. Given the emergence of EMA was based on the premise to enhance companies internal decision making as well as external reporting (Burritt et al., 2002; Bennett et al., 2002b), it is pertinent here to first review the ER literature so as to draw the boundaries of the present study. Therefore, the first section offers a discussion on ER, with a primary focus on ER made in the annual reports. In the second section, a discussion on EMA is offered to include the contexts of EMA, benefits to be obtained from EMA implementation and contingent variables associated with such implementation. In the third section, the association between EMA implementation and ER practices is discussed, incorporating the theoretical insights from social issue life cycle theory. Key issues reflected in the review of literature are summarised in the conclusion section.

2.1 Environmental Reporting (ER)

The emergence of the Industrial Revolution in the late 18th century has brought monumental changes to the global economy and society. However, along with the

increased emphasis on mass production and technological advances, the problems of environmental degradation are fast exacerbating. This has led to growing concerns over business environmental impacts, which in turn put stress on the role of companies in society. Among others, corporate external reporting, being the most important source of corporate information, has changed considerably in the last few decades to include non-financial information beyond the conventional business agenda.

2.1.1 Evolution of ER

The 1970s has ushered in the era of non-financial reporting, referred to as social reporting (Mathews, 1997; Gray, 2001; Herzig and Schaltegger, 2006). In response to the outpouring public scrutiny over the impact of companies' business activities on the society, companies began to incorporate social aspects into financial reporting to depict their relationship with the society (Herzig and Schaltegger, 2006). The notion of accountability towards the society has been included in tandem with companies' profit-maximization goals. Throughout the first decade of the era, companies placed a greater emphasis on issues related to employees and products, with little consideration on the environment (Mathews, 1997), resulting in many early studies to define the environment in a broader term of social (Deegan, 2002).

However, owing to the hostility in social concept, social reporting departed from the mainstream accounting agenda in the 1980s (Gray, 2001; Lodhia, 2003), particularly due to the insufficient of mandatory requirements and value judgments of corporate social activities (Lodhia, 2003). It was not until then that ER emerged as the prime focus of the researchers, along with the upsurge concern on companies' responsibility towards environmental protection (Mathews, 1997; Gray, 2001; Deegan, 2002; Herzig and Schaltegger, 2006; Owen, 2008). The increased interest of the governments,

professional accounting professions and industry bodies on companies' ER practices has occasioned increased attempts to account for these "externalities" (Mathews, 1997; Owen, 2008).

Externality as generally used by the economists, corresponds to "the activity of one individual externally affect the utility of another individual" (Buchanan and Stubblebine, 1962, p. 381). From a company's business activities perspective, Beaver (1989) describes externality as a form of "market failure" where the public is not charged or compensated for any consequences resulting from a company's business activities, suggesting that externalities can either be positive or negative. Positive externalities benefit the public through the consumption of goods and services. For example, the development of green infrastructure in housing area promotes a healthy life style. Negative externalities, in contrast, are costs to the public. For example, throughout constructing the green infrastructure development, the exposure to wastes and emissions can deteriorate public health. In sum, externalities can be considered as a state where a company externalises costs and benefits arising from its business activities to the public (Crowther and Aras, 2008).

Because of the nature of externalities, they were traditionally deemed as financially immeasurable and excluded from conventional accounting practices (Crowther and Aras, 2008; Jones, 2010). However, disregarding externalities which can be a consequence of some crucial economic activities is a poor long term-strategy (Epstein and Roy, 2003; Crowther and Aras, 2008) because the real accounts of the circumstances cannot be fully conferred (Zulkifli, 2012). As a result, efforts have been made to internalise externalities, especially the negative externalities. Environmental regulations are one of the efforts, in such a way that companies are compelled to pay fines or penalties for any non-compliance cases or any activities that have been regulated to harm the public or

the environment in general (Jasch, 2009). Through regulations, companies are forced to take into consideration their environmental performance because non-compliance cases are oftentimes costly and can compromise corporate image. Another effort at measuring externalities is through the development of EMA. This will be discussed in a greater detail in a separate section.

It is because the public also has to pay for the negative externalities, in terms of deterioration of health and living conditions (Gray et al., 1996; Jasch, 2009), that a form of social responsibility has been initiated, entailing a symbiotic contract between a company and the public (Friedman, 1970). In particular, companies while doing the business are expected to use resources effectively and engage in practices without deception or fraud so as to minimise the externalised costs (Friedman, 1970).

Despite the massive attention on ER and related accounting issues concerning the externalities, interest on social responsibilities re-emerged in the mid-1990s largely due to the experiences of ER (Gray, 2001). As a result, a new form an integrated non-financial reporting or often referred to as sustainability reporting, has transpired in the new millennium, embedding both environmental and social aspects into economic considerations (Gray, 2001; Lamberton, 2005).

For the purpose of the present study, ER is the focal interest. However, where available, a review of literature on CSR and sustainability reporting is included to enrich the discussion as both reporting encompass environmental aspects.

2.1.2 What Constitutes ER?

Definitions applicable to ER are varied. For example, ER is construed as "those disclosures that relate to the impact company activities have on the physical or natural environment in which they operate" (Wilmshurst and Frost, 2000, p. 16). Lodhia (2003) views ER as a form of companies' commitment to the society concerning their business environmental impacts. De Villiers (2004) embeds the stakeholders' right to environmental information in defining ER where it is considered as a governance tool that safeguards the stakeholders' right by limiting the powers of managers through the disclosure of the company's environmental undertakings.

The Association of Certified Chartered Accountants (ACCA) perhaps provides a more extensive meaning of ER. According to ACCA (2003a, p. 9), ER is,

> …the disclosure by an entity of environmentally related data, verified (audited) or not, regarding environmental risks, environmental impacts, policies, strategies, targets, costs, liabilities, or environmental performance to those who have an interest in such information, as an aid to enabling/enriching their relationship with the reporting entity via either:
>
> - the annual report and accounts package
> - a stand-alone corporate environmental performance report
> - a site-centred environmental statement, or
> - some other medium.

Besides reporting the environmental impacts of their business operations and products, companies are also expected to present ways on how they handle the impacts (ACCA, 2003a).

There are also studies that developed a specific instrument, often referred to as a disclosure index, to determine if the information pertains to ER, for example, Hackston and Milne (1996) and Williams (1999). This is consistent with Gray et al.'s (1995b) argument that definition needs to be precise and unique to minimise the uncertainty in determining what is and what is not ER.

Despite the variability in definitions, it is starkly clear that the aspect of transparency is greatly accentuated as a fundamental aspect in reporting environmental information to the stakeholders. Transparency, according to GRI (2011, p. 6), constitutes,

> …the complete disclosure of information on the topics and indicators required to reflect impacts and enable stakeholders to make decisions, and the processes, procedures, and assumptions used to prepare those disclosures.

In its recent publication *Sustainability Reporting Guidelines (Version 3.1)*, GRI (2011) comprehensively discussed the characteristics of transparency which include balance, comparability, accuracy, timeless, clarity and reliability. Balance concerns with the disclosure of both positive and negative aspects of the company's social and environmental performance. Comparability and timeliness entail the company to report consistently so as to allow the stakeholders to analyse changes in the company's performance over time and conduct comparative analysis with other companies. Finally, the reported information should be clear and accurate to ensure its reliability for it to be subjected to examination. Therefore, companies that attempt on reporting environmental information should maintain these parameters to warrant a comprehensive and useful ER.

2.1.3 Theories in ER Research

ER or CSRR in general is a complex practice in such a way that while companies strive to maximise the shareholders' values, they have to align their business activities with the expectation of a variety groups of stakeholders (Crowther and Aras, 2008). Because of this, prior ER research has drawn upon multiple theories to address and understand the reporting practices from different reporting needs of different interested parties. These include legitimacy theory, stakeholder theory, institutional theory and social issue life cycle theory.

Legitimacy theory, stakeholder theory and institutional theory are derived from political economy theory which suggests that the social and institutional frameworks, and political aspects are significant in justifying economic phenomena (Gray et al., 1995a; Deegan, 2006a). While the literature seems silent on whether social issue life cycle is rooted in political economy theory, prior discussions on the theory explicitly show that social issue life cycle theory also takes into consideration social, economic and political aspects in describing companies' environmental strategies (Nasi et al., 1997; Zyglidopoulos, 2003; Alrazi et al., 2009). Political economy theory has two branches, classical and bourgeois. The Classical or Marxian branch considers that social class interests, structural inequity, conflict and the role of the State are important in justifying economic phenomena (Gray et al., 1995a; Deegan, 2006a). In the context of ER, the one who controls the resources uses the reporting to maintain its position. On the other hand, bourgeois political economy theory omits class or inequality elements by putting a greater emphasis on the interaction between groups in plurality or societal concerns (Gray et al., 1995a; Deegan, 2006a). In other words, ER relies on the notion of a 'social contract' (O'Donovan, 2002). Legitimacy theory and stakeholder theory derive from this branch of political economy theory.

For the purpose of the present study, only legitimacy theory and social issue life cycle theory are discussed in length[13].

2.1.3.1 Legitimacy Approach in ER Research

While there is no accepted theory for social and environmental reporting (Deegan, 2002), legitimacy theory has been used in many ER studies to explain why companies

[13] Stakeholder theory in general, suggests that companies, in order to be successful, need to address the interests of the stakeholders (Freeman, 1984). The theory can be further looked upon from two fundamental perspectives: normative and managerial (Freeman, 1984; Donaldson and Preston, 1995). Normative relates to ethical view in which companies engage in ER or CSRR to reflect their ethical considerations towards the stakeholders' right to environmental and/or social information, while, managerial relates to companies' decision to gain business legitimacy from appropriate stakeholders through ER or CSRR (Freeman, 1984; Donaldson and Preston, 1995; Deegan, 2006a). Institutional theory, on the other hand, explains why companies shares common pattern or characteristics with respect to ER (DiMaggio and Powell, 1983; Deegan, 2006a).

reported certain information and how companies should report their environmental information (Campbell et al., 2003; Tilling, 2004; Deegan, 2006b). The works of Parsons (1960), Weber (1968) and Dowling and Pfeffer (1975) are among the earliest research to discuss organisational legitimacy as a corporate strategy in understanding corporate reactions to environmental pressure (Suchman, 1995). Based on these earliest works, Suchman (1995, p. 574) defines legitimacy theory as,

> …a generalised perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions.

Lindblom (1994) argues that it is essential to first distinguish between legitimacy (i.e. a status or condition) and legitimation (i.e. a process pursuing that status). Legitimacy exists when the value system of a company is congruent with the value system of the larger social system and a disparity between the two value systems may pose threat to the company's legitimacy (Lindblom, 1994). In other words, in order to attain legitimacy, companies are more likely to operate in conformity to public expectation (Wilmshurst and Frost, 2000; O'Donovan, 2002; Campbell et al., 2003; Deegan, 2006b; Cho and Patten, 2007).

On the other hand, the legitimation strategies may differ depending on whether the company is attaining legitimacy, maintaining legitimacy or repairing the lost or threatened legitimacy (Suchman, 1995; O'Donovan, 2002). In particular, a company with no prior reputation needs to be proactive in gaining legitimacy by controlling the dissemination of information (Suchman, 1995; O'Donovan, 2002). The task of maintaining legitimacy is easier than attaining or repairing legitimacy, of which requires the company to predict future changes while securing its past accomplishment (Suchman, 1995). As for repairing legitimacy, while resembling the task of gaining

legitimacy, the company needs to be reactive to unforeseen events (Suchman, 1995; O'Donovan, 2002).

A large body of empirical research undertaken within the legitimacy perspective draws upon maintaining and repairing legitimacy (O'Donovan, 2002). For example, a greater pressure to being legitimate is claimed to be the main reason for companies in environmentally sensitive industries to report more environmental information than those in the less sensitive industries (Deegan and Gordon, 1996; Frost and Wilmshurst, 2000; Deegan et al., 2002; Brammer and Pavelin, 2006, 2008; Buniamin, 2010; Bouten et al., 2011). Chemical, constructions, plantations, mining and resources, petroleum, transportation, properties and industrial products are the examples of environmentally sensitive industries (see Deegan and Gordon, 1996; Frost and Wilmshurst, 2000; Ahmad et al., 2003; Nik Ahmad and Sulaiman, 2004; Jaffar, 2006; Alrazi et al., 2009; Buniamin, 2010).

Furthermore, it also has been suggested that legitimation strategies may associate with company size (Hackston and Milne, 1996). They argue that the larger the company, the more activities they carry out and thus the greater impact they have on the society and the environment. In such circumstances, the ability of a company to maintain its legitimacy will secure its going concern. Such a view is confirmed by previous findings that suggest large companies disclosed more environmental information than small companies (Gray et al., 1995a; Deegan and Gordon, 1996; Hackston and Milne, 1996; Neu et al., 1998; Cormier and Gordon, 2001; Cormier and Magnan, 2003; Sinclair and Walton, 2003; Buniamin, 2010; Wan Abdul Rahman et al., 2011).

The propensity to use ER as an approach to maintain legitimacy is also being associated with GLCs. Given GLCs are politically supported by the government and often are large, they tend to report more information than non-GLCs to be seen as legitimate and thus reflecting its 'accountability' and 'visibility' (Cormier and Gordon, 2001; Amran and Susela, 2008; Said et al., 2009; Wan Abdul Rahman et al., 2011). In a study that focuses on the relationship between the quality of ER and government ownership, Jaffar et al. (2007) found that the higher the government ownership, the greater the quality of disclosure.

Findings in many extant studies also demonstrate a reactive approach to legitimacy. For example, Buhr (1998) in examining disclosure practices of Falconbridge, a company which involved in mining and smelting of nickel, found that after a series of ambient air quality regulations were imposed, the disclosure was more about complying with the regulation. In the case of BHP Ltd. which is one of the largest steel companies in Australia, Deegan et al. (2002) observed that within the period from 1983 to 1997, the company released more positive social and environmental information publicly in response to negative media attention. In a study that focused on non-litigation environmental disclosures between better and worse environmental performers, worse environmental performers are found to disclose more non-litigation information than better environmental performers (Cho and Patten, 2007). In a more recent study, Bouten et al. (2011) found that Belgian utility companies reported more environmental information and that they tended to provide 'substantive' environmental information than 'symbolic'. Substantive refers to an activity involving material changes to companies' goals, structures or behaviour while symbolic involves with no changes, but it is simply an attempt to portray favourable companies' activity (Day and Woodward, 2004).

However, there are also studies that found mixed or limited support to the legitimating purposes of ER. For example, in a longitudinal study of three FTSE industries (tobacco, brewing and retailing) in the UK covering over 20 years of environmental and social reporting, Campbell et al. (2003) found mixed results on the influence of legitimacy on companies' reporting. More specifically, those companies that were expected to report more of their environmental information due to the nature of their activities did not constantly doing so, while those with lesser pressure to legitimacy, sometimes, reported more. Reportedly, the view that larger companies report more environmental information can only be generalised to environmentally sensitive industries. In particular, it was observed that there is a positive relationship between large companies in environmentally sensitive industries and the reporting of environmental information (Deegan and Gordon, 1996; Hackston and Milne, 1996; Neu et al., 1998; Cormier and Gordon, 2001; Cormier and Magnan, 2003; Sinclair and Walton, 2003; Brammer and Pavelin, 2006, 2008). More specifically, the finding suggests that large companies in environmentally sensitive industries reported more environmental information, indicating that size alone is not a sufficient indicator of companies' legitimation strategies.

Apart from maintaining good governance, the presence of NEDs is significant in ensuring the effectiveness of management decision as they are the 'check-and-balance' unit to ensure that company's decisions toward maximization of wealth are for the best interest of the shareholders as well as stakeholders (Haniffa and Cooke, 2005). Because of this, it is argued that a greater number of NEDs on a board may contribute to more efforts to maintain or enhance its corporate image (i.e. legitimacy) (Said et al., 2009). However, there is no compelling evidence to support such a view. In a longitudinal analysis that explored the impact of NEDs on CSR disclosure of 139 Malaysian PLCs

using the 1996 and 2002 annual reports, Haniffa and Cooke (2005) found that the proportion of NEDs did not have a significant impact on the disclosure practices of companies. Similarly, Said et al. (2009) reported that there is no conclusive evidence to support the proposition that the proportion of NEDs is associated with the level of CSRR. On the other hand, by using a sample of 450 UK companies, Brammer and Pavelin (2006, 2008) observed that companies with more non-executive directors in the board were less likely to disclose their environmental initiatives. Consistent with these findings, Barako et al. (2006) found that the extent of voluntary disclosure of Kenyan companies listed on the Nairobi Stock Exchange (NSE) from 1992 to 2001, was negatively associated with the proportion of NEDs. In a more recent study, it is once again confirmed that there is a negative association between the proportion of NEDs and the extent of CSR disclosure (Esa and Mohd Ghazali, 2012).

Despite the mixed results, a great deal of evidence shows that attaining legitimacy has led to more ER engagement. However, it must be emphasised here that while ER can provide greater degree of visibility to companies' environmental activities, it can also reduce what is known about such activities (Hopwood, 2009). Such concept therefore, is useful in examining the interplay between companies' internal management practices and ER practices, from a social issue life cycle perspective which will be discussed in the subsequent section.

2.1.3.2 Social Issue Life Cycle Approach in ER Research

The employment of social issue life cycle theory in explaining companies' ER practices, however, seems not as prevalent as legitimacy theory or stakeholder theory. This is probably due in large part to the approach of prior ER research which largely conducted cross-sectional analysis, while social issue life cycle theory concerns on the trend of

reporting (Alrazi et al., 2009). In particular, social issue life cycle theory proposes that an issue evolves from being insignificant to remarkably significant, and that companies' reaction to the issue is largely depending on the evolution (Nasi et al., 1997; Zyglidopoulos, 2003). An issue arises when there is a gap between companies' actual performance and public expectation, or also known as legitimacy gap (Sethi, 1979; Bigelow et al., 1993). In the ever changing business environment as a result of changing public perception, it is very crucial for companies to be responsive to legitimacy gap because they may gain or lose in their reputation by respectively leading or lagging behind in the evolution of societal expectations (Mahon and Waddock, 1992; Zyglidopoulos, 2003).

From the above discussion, social issue life cycle theory in a broad sense encompasses a legitimacy aspect. That is, the extent to which a company responds to an issue is contingent upon the urgency or determination to address the issue (Nasi et al., 1997), reflecting the legitimation strategies. However, as much as companies are keen towards the idea of legitimising their environmental performance (Hopwood, 2009), they actually can play an important role in solving environmental problems (Penna and Geels, 2012). In this regard, social issue life cycle theory proposes that a company's reaction to social issues which include environmental consideration, follows a predictable evolutionary trajectory (Nasi et al., 1997). More specifically, a company's reaction is not a series of random changes, but instead, it is a gradual effort to find the best solution to the issue.

In identifying the number of stages or phases in which an issue evolves, prior research, however, was varied. For example, Mahon and Maddock (1992) claimed that there are

four stages[14] of issue development, while Ackerman (1975) as cited by Nasi et al. (1997) suggested that there are three stages. Regardless the dispute, Nasi et al. (1997) affirmed that both models are similar in terms of the flow an issue evolves. Similarly, Zyglidopoulos (2003) in his review on the evolution of issues concluded that it is agreeable among the theorists that an issue evolves from an "insignificance" stage (i.e. the issue is not important) through an "increased concern" stage (i.e. the issue becomes significant) to the last stage where an established solution for the issue is available (see Figure 2.1). In addition, the evolution of an issue is influenced by the external (macro level) and internal (micro level) factors, of which according to Zyglidopoulos (2003), both factors are inter-related to such an extent that each cannot evolve independently. The external factor derives from changes in societal expectation, while the internal factor is the changes in companies' management practices or cultures resulting from any given issue (Zyglidopoulos, 2003), for example, changes in regulation or new environmental strategies.

Source: Zyglidopoulos (2003)

Figure 2.1: Evolution of an Issue

Based on Ackerman's (1975) model of issue development, Nasi et al. (1997, p. 298-299) summarise the three phases of social issue life cycle: Policy, Learning and Commitment; in relation to corporate decision to companies' environmental efforts (see Table 2.1). Addressing environmental issues for companies in the Policy phase is no more than paying lip-service. Companies in this phase generally do not have formal

[14] The four stages of issue development are first, a gap between public expectation and companies' performance, second, 'politicization' – a politician shapes a legislative for the issue (i.e. gap), third, 'legislative' – when regulations are enacted for the issue, and fourth, 'litigation' – when the relevant governmental agencies and companies work together for the specifics of the implementation (Mahon and Maddock, 1992, p. 22).

action to address environmental issues as meeting public expectation is not an immediate concern. More specifically, environmental issues are merely the managerial concern.

Table 2.1: Phases of Social Issue Life Cycle

Phase	Descriptions
Phase 1 – Policy	▪ Environmental issues are merely managerial concerns. The management normally responds to such issues by offering a statement or policy pertaining to the company's commitment. ▪ As meeting public expectation is not an immediate concern, no formal action is taken to deal with the issues.
Phase 2 – Learning	▪ The awareness on environmental issues accelerates and a specialist/professional is often hired to implement the company's environmental policy. Such policy, however, is not integrated into the company's decision-making process.
Phase 3 – Commitment	▪ Environmental issues become the responsibility of the line managers, hence, are incorporated into the company's business decision-making and performance evaluation. ▪ A supplementary environmental reporting and auditing practices are developed to educate the stakeholders about the company's environmental performance.

A specialist or professional is often hired when the awareness on environmental issues becomes apparent to help the companies to implement their environmental policy and targets. However, the policy implementation is not integrated into companies' decision making process, suggesting that addressing environmental issues is only for legitimation purposes. This is a manifestation of a company in the Learning phase.

It is in the last phase – Commitment, where companies finally found the best approach to address their environmental issues. This is demonstrated by the integration of environmental issues into the on-going business performance evaluation. Given the deficiency of conventional accounting practices to capture environmental information (Burritt et al., 2002; Schaltegger et al., 2003; Burritt, 2004), the EMA implementation is

the well-established solution to environmental issues. Oftentimes, a supplementary ER and auditing practices are generally produced by companies in this phase (Nasi et al., 1997). Through EMA implementation, more and relevant environmental information can be made available for reporting purposes, hence making the reporting feasible.

Apart from Ackerman's model, there are also several other social issue life cycle models. For example, Sethi (1979) developed a 4-stage schema of issue evolution process of which the business strategies are categorised into, in an attempt to narrowing the legitimacy gap. From the public perspective, Buchholz (1988) identified 3-stage of issues development to include formation of public opinion to policy formulation before it becomes regulated (refer to Figure 2.2). However, for the purpose of the present study, Ackerman's model (as cited by Nasi et al. (1997)) is employed as it offers a comprehensive framework for evaluating companies' responses to social and/or environmental issues.

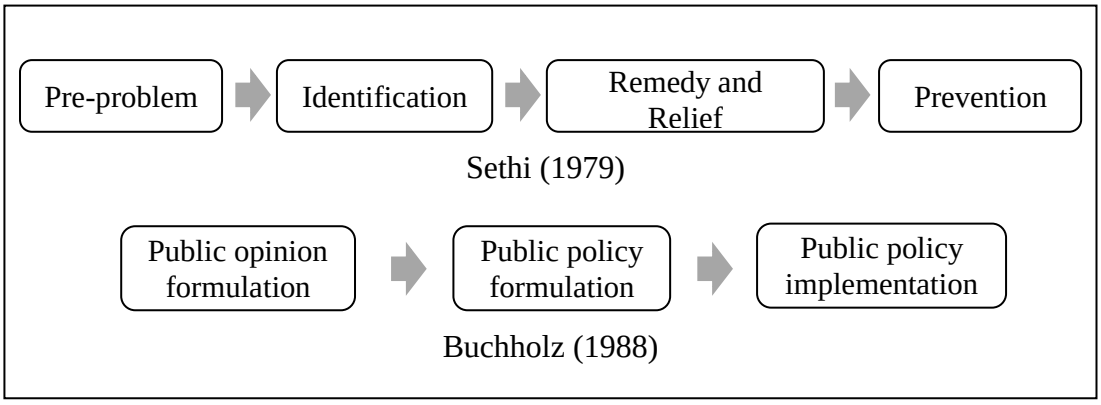


Figure 2.2: Social Issue Life Cycle Models

The application of social issue life cycle theory in empirical ER research is rather limited. In a longitudinal study of four large Canadian and Finnish companies in forestry industry covering 16 years, Nasi et al. (1997) conducted content analysis of corporate annual reports to explore the applicability of social issue life cycle theory in

explaining companies' ER practices. Over the 16-year period, they found support to the contention of the evolution of issue. In particular, there was a clear change in the trend of ER of the four companies, in such a way that more relevant information being reported parallel to the development of greater commitment. However, it was observed that the trajectory trend seemed not to be consistent as the trend was influenced by other factors. For example, in all four companies, the decrease in their environmental performance was associated with low attention to social issues.

Alrazi et al. (2009), through content analysis of annual reports of 96 Malaysian large companies in 1999, 2003 and 2006, found limited support to the applicability of social issue life cycle theory. They observed that the trend of ER (both quantity and quality of ER) among the companies significantly increased from 1999 to 2003, parallel with the increasing governmental concern on companies' environmental activities. In particular, between the years, about 10 subsidiary legislations were introduced under the EQA 1974, including explicit references to ER in accounting standards: FRS 101 and FRS 137 (Alrazi et al., 2009). In contrast, between 2003 and 2006, a downward trend was observed owing to the absence of substantial changes in legislations with regard to ER or environmental activities in general. These findings suggest that companies is more likely to respond to increased scrutiny about their business environmental impacts by reporting more environmental information, instead of being committed to improving or maintaining their accountability towards the environment.

Although not specifically on ER practices, Eweje (2005) conducted a case study in the South African mining industry to examine the behaviour of multinational mining companies regarding hazardous employment and health and safety of employees. In a similar approach, Eweje (2006) investigated the issue of environmental costs and

responsibilities resulting from oil exploitation and production in Nigeria. Both studies found support to the applicability of social issue life cycle theory in explaining the companies' undertakings regarding environmental efforts. Changes in mining regulations and pressure from unions and independent advisory committees led to the reduction in accident and fatality rate recorded by the South African companies from 23.93% in 1984 to 14.99% in 1998 (Eweje, 2005). Similarly, interviews with the management as well as key stakeholders show that once the issue was identified impacting the corporate image, there was a visible change in corporate strategies of Nigerian oil companies to incorporate environmental impact assessment (Eweje, 2006).

In a recent case study examining the trend of American automakers' responses to air pollution problems (1943–1985), Penna and Geels (2012) found that the industry's responses exhibited a trend towards increased commitment to air pollution problems. That is, in the initial phase of the crisis, the industry was unconcerned with public opinion with regard to the negative impact of the industry (through 'smog') by simply denying the allegation. As concerns on air pollution increased, the car industry was seen to form a committee to develop emission control technologies and other radical efforts to address the finger pointing. When air pollution entered the legislative phase, the car industry took another initiatives, for example, installing PCV devices (to automatically control emission), aiming to slow the legislative progress. Despite the efforts, Clean Air Act was introduced in 1970 and a radical increase in research and development (R&D) investments and patenting was observed before the issue progression became dormant until the 1990s due to competing issues: oil shock, fuel efficiency and economic problems. Overall, consistent with social issue life cycle theory, the authors suggest that the changes were not related to air pollution problems per se, but also to other external

factors, such as cultural trends, market pressure, profits/losses, political climate and competing issues.

While previous studies covered in the above discussion are all in the area of ER and that are longitudinal studies, the applicability of social issue life cycle theory to explain the association between EMA implementation and ER practices is compelling. This will be discussed in greater depth in a latter section in this chapter.

2.1.4 Content Analysis of Annual Reports

A range of reporting mediums has been used by companies to disseminate their environmental information externally. These include annual reports, websites, stand-alone environmental reports, brochures and newspapers. Annual reports perhaps are the most common reporting mechanism used by companies to disseminate their environmental information to the stakeholders (Gray et al., 1995a; Neu et al., 1998; Freedman and Stagliano, 2002; Othman and Ameer, 2010). This is primarily due to the attribute of annual report as the primary and reliable information source for stakeholders to assess companies' performance (Neu et al., 1998; Milne and Patten, 2002), making it as the best option for responding to specific group (Zeghal and Ahmed, 1990; Ferreira, 2004).

Given such a distinct feature, a great deal of prior studies have emphasised on examining companies' annual reports in understanding companies' ER practices via a content analysis approach (Unerman, 2000). The extensive use of content analysis validates the use of this instrument as a research tool in social and environmental reporting (Hooks and Van Staden, 2011). The pertinence of corporate annual reports in understanding of companies' ER practices further complements the decision of the

present study to focus on this particular medium upon which the CSRR in annual reports is now mandatory to all Malaysian PLCs.

For content analysis to be effective, prior studies constructed an environmental disclosure index to provide a parameter to decide which information pertains to environment (e.g. Hackston and Milne, 1996; Milne and Adler, 1999; Williams, 1999). The disclosure index incorporates a list of items which is expected to appear in companies' ER (Hooks and Van Staden, 2011). With the development of perhaps a more reliable and established reporting guideline, that is, *Sustainability Reporting Guidelines* issued by the GRI, it has been evidenced that many recent empirical works have made reference to these guidelines in formulating their instrument (e.g. Raar, 2007; Clarkson et al., 2008; Beck et al., 2010). In Malaysia for example, as CSRR has been commissioned as mandatory recently, many recent studies incorporated relevant items of the CSRR framework to reflect the perspective of Malaysian companies (e.g. Said et al., 2009; Othman et al., 2011; Zainal et al., 2013). There are also studies that focused specifically on certain international environmental agreement such as Kyoto Protocol (currently known as Protocol) (e.g. Freedman and Jaggi, 2005), SustainAbility index (United Nations Environment Programme) (e.g. Van Staden and Hooks, 2007) and corporate greenhouse gas (GHG) reporting (e.g. Rankin et al., 2011).

In measuring the quantity or extent of disclosure ("how much is being reported"), a content analysis of annual report involves the measuring of ER in terms of word (Frost and Seamer, 2002; Ahmad et al., 2003; Campbell et al., 2003), sentence (Williams, 1999; Deegan et al., 2002; Nik Ahmad and Sulaiman, 2004; Van Staden and Hooks, 2007; Alrazi et al., 2009; Buniamin, 2010; Hooks and Van Staden, 2011; Zainal et al., 2013), page or proportion of pages (Gray et al., 1995a) and pictures or graphics (Haniffa

and Cooke, 2005; Yusoff et al., 2007). There remains, however, a controversy as to which unit of analysis provides the best practice (Hooks and Van Staden, 2011). For example, Milne and Adler (1999) argue that sentence count provides a far more reliable measure than those of word and page count because individual words without sentences convey no meaning. Different coders may have different views on which word reflects a reporting, and which is not. Using page count as measurement shall be subjected to print sizes, column sizes and page sizes which these may vary between companies. On the other hand, while Unerman (2000) seems to agree that sentence count provides greater accuracy than page and word count, the use of sentence, however, relies on the volume of narrative disclosure. More specifically, two different writers may convey similar meanings but using a different number of sentences (Unerman, 2000).

As regards measuring the quality of ER ("what is being reported"), two common approaches, namely, 'weighted' and 'unweighted' score have been employed in previous studies. A weighted score approach involves with scoring the reporting depending on its emphasis, that is, a scale of score is assigned (i.e. normally more than 0 and 1) with the highest score is given if companies reported quantified and specific environmental information (e.g. Cormier and Gordon, 2001; Freedman and Jaggi, 2005; Aerts et al., 2006; Van Staden and Hooks, 2007; Zainal et al., 2013). In contrast, an unweighted score approach or also known as dichotomous, uses binary scoring – "0" for non-disclosure, and "1" for disclosure. In some previous studies, instead of using the word, sentence and pages count, the binary scale was used to measure the quantity of ER (Al-Tuwaijri et al., 2004). Similar to the quantitative measure, both approaches have their weaknesses. Granting that the weighted method may provide a better measure of the quality of disclosure compared to the unweighted method as it embodies the

intensity of the reporting, the former, however, increases the subjectivity or bias in researcher's judgment (Owusu-Ansah, 1998; Hooks and Van Staden, 2011).

Perhaps a more traditional way to measure ER is through examining the "theme" of reporting, for example, the location and degree of quantification of environmental information (e.g. Niskala and Pretes, 1995; Gray et al., 1995b; Ahmad et al., 2003; Nik Ahmad and Sulaiman, 2004; Thompson and Zakaria, 2004; Monteiro and Aibar-Guzman, 2010). Although the degree of quantification provides significant indication to the intensity of ER, Gray et al. (1995b) argue that the literature failed to permit a reason why location of disclosure, such as the Chairman's statement and operation reviews, is significant in understanding companies' motives for ER. Table 2.2 summarises the descriptions to the types of disclosure.

Table 2.2: Degree of Quantification of Environmental Information

Evidence	Descriptions
Monetary	Environmental disclosure that contains and/or relates primarily to financial disclosure of actual financial numbers expressed in monetary terms.
Non-monetary	Environmental disclosure that contains any physical environmental measures such as emission levels and forest materials consumed in production by volume.
Declarative	Environmental disclosure that contains all verbal disclosure.
Good	Statements beyond the minimum which include specific details which have a creditable or neutral reflection on the company or any statements which reflect credit on the company or upbeat analysis/discussion/statements.
Bad	Any statement which reflects or might reflect discredit on the company.
Neutral	Statement of policy or intent within statutory minimum with no details of what or how; statement of facts whose credit/discredit to the company is not obvious – which are unaccompanied by editorializing.

Source: Niskala and Pretes (1995) and Gray et al. (1995b).

2.1.5 Various Areas of ER Research

ER research is not limited to examining companies' ER practices per se. Over the last few decades, a lot of effort has been made to incorporate other aspects such as political, culture, professionalism, education and economic value to provide a more nuanced understanding on companies' ER practices. Deegan (2002) has summarised some areas and ideas that have been investigated and some are still pertinent of late (see Table 2.3).

Table 2.3: Summary of Prior ER Research Topics

Topic	Authors (Year)
What are companies reporting?	Teoh and Thong (1984); Andrews et al. (1989); Guthrie and Parker (1990); Harte and Owen (1991); Lynn (1992); Adams et al. (1995); Gibson and Guthrie (1995); Niskala and Pretes (1995); Deegan and Gordon (1996); Gamble et al. (1996); Choi (1999); Bell and Lehman (1999); Newson and Deegan (2002); *Ahmad et al. (2003); Buniamin (2010); Alrazi et al. (2009); Bouten et al. (2011)*
Can social and environmental disclosure be linked to other attribute of performance, such as economic performance or to factors such industry, culture or size?	Ingram and Frazier (1980); Trotman and Bradley (1981); Ullman (1985); Cowen et al. (1987); Fayers (1998); Newson and Deegan (2002); *Al-Tuwaijiri et al. (2004); Murray et al. (2006); Mustaruddin et al. (2011)*
How do particular stakeholders react to social and environmental disclosure?	Ingram (1978); Buzby and Falk (1978, 1979); Anderson and Frankle (1980); Jaggi and Freedman (1982); Shane and Spicer (1983); Freedman and Jaggi (1986, 1988a, b); Epstein and Freedman (1994); Blacconiere and Patten (1994); Tilt (1994); Deegan and Rankin (1997)
What are accountants' attitudes to social and environmental disclosure?	Bebbington et al. (1994); Deegan et al. (1996); *Lodhia (2003); Mohd Said et al. (2013)*
What is the correspondence between social and environmental disclosure and actual corporate performance?	Wiseman (1982); Rockness (1985)
What are the roles of taxation instruments in relation to environmental protection?	Baumol (1975); Lockhart (1997); O'Riordan (1997)

Table 2.3, *continued.*

Topic	Authors (Year)
How is accounting education embracing the area, and what are some of the impediments to including social and environmental issues with the accounting education programs of universities and professional accounting bodies?	Blundell and Booth (1988); Gray et al. (1994); Gibson (1997); Gordon (1998); Gray and Collison (2001); *Zulkifli (2012), Deegan (2013)*
How should organisations account for their social and environmental performance? Should externalities be attributed a "cost" for financial accounting purposes?	C.C. Abt Associates (1972); Milne (1991); USEPA (1996); Bebbington and Gray (1997); Mathews (2000); *Jasch (2003); Jasch (2009); Burritt et al. (2002)*
What theories best explain how we do report, or perhaps, how we should report social and environmental information?	Ramanathan (1976); Cooper and Sherer (1984); Benston (1982, 1984); Belkaoui and Karpik (1989); Mathews (1993, 2000); Gray et al. (1996); Lehman (1999); Deegan (2000); *Jones (2010); Hopwood (2009); Tilling and Tilt (2010); Mahadeo et al.(2010)*
What motivates managers to make particular social and environmental disclosures?	Guthrie and Parker (1989); Patten (1992); Roberts (1992); Deegan and Gordon (1996); Deegan and Rankin (1997); Adams et al. (1998); *Wilmshurst and Frost (2000); Nik Ahmad and Sulaiman (2004)*
What is the role, or scope, of social and environmental verifications, attestations or audits (and these can all take on various forms)?	Bauer and Fenn (1973); Grojer and Stark (1977); Brooks (1980); Geddes (1991); Gray and Collison (1991); Gray et al. (1991); Zadek (1993); Gallhofer and Haslam (1995): Power (1997); Owen and Swift (1999); Ball et al. (2000); Owen et al. (2000); Gray (2002); *O'Dwyer (2005)*
Are current or proposed social and environmental reporting practices really of benefit to the broader community, or do they simply act to legitimise existing social structures which benefit some groups at the expense of others?	Puxty (1991), *Cho and Patten (2007)*

Source: Adopted from Deegan (2002). Selected new articles on the relevant topic are shown in *italic.*

2.1.6 Overview of Environmental Practices in Malaysia

In this subsection, insights on the evolution of ER practices in Malaysia and major establishments that shaped such practices are discussed. Besides reviewing the previous ER and CSRR studies conducted in Malaysia, the historical background of Malaysia and the environmental initiatives of the government and professional accounting bodies to improve environmental undertakings among Malaysian companies are first discussed. It has been established that these initiatives have a profound impact on corporate ER practices (ACCA, 2010a).

2.1.6.1 Malaysia and Environmental Problems

Malaysia is a multi-cultural country, constituting three major ethics: Malay, Chinese and Indian. According to the latest statistics released by the Department of Statistics, the population of Malaysia has reached 30 million, with Malays making up the majority (67.4%), followed by Chinese (24.6%), Indian (7.3%) and others (0.7%). The capital city of Malaysia is Kuala Lumpur and the official religion is Islam. Geographically, Malaysia covers 329,847 square km of landmass which divided into Peninsular Malaysia (West Malaysia) and Malaysia Borneo (East Malaysia). About two-third of Malaysia's land surface is covered with forest (Saw, 2007). With the tropical climate which is conducive to species growth and evolution[15], Malaysia is blessed with rich and diverse biodiversity. Economically, since its independent in 1957, the country has progressed from an agricultural to an industrial economy (Mustafa, 2011), and to position itself as a fully developed country by the year 2020. Despite the concentration on industrial sector, Malaysia remains as one of the world's largest producers of palm oil until today. Malaysia also has among the strongest economic performance in Asia.

[15] *Biodiversity in Malaysia.* Retrieved on July 3, 2013 from http://www.climateavenue.com/biodiversity.malaysia.htm

With the growing emphasis on industrial economy since 1990, environmental issues have become more salient ever since. According to the UN-REDD, within a 20-year span (from 1990 to 2010), Malaysia has lost almost 8.6% of its forests due to development projects. In the first quarter of 2013, it was reported that the rate of deforestation in Malaysia has increased by 115%, of which it comes second to Nepal (114%), followed by Mexico (92%), Argentina (72%) and Madagascar (51%) (The Star Online, 2013a). The effects of deforestation on the local communities, especially the indigenous people, are becoming widespread. Many have been forced to move into other areas, putting a greater risk of losing their culture and source of income. Moreover, due to indiscriminate land clearings for agricultural and infrastructure developments, landslides and flash floods have become increasingly common in Cameron Highlands – the Malaysia's agriculture heartland, causing concerns on the part of the public. In 2011, the landslide which hit the oldest Orang Asli (indigenous people) settlement has claimed seven lives (The Star Online, 2011). Recently, the siltation of the Ringlet reservoir has caused a mud flood where at least three people were killed while hundreds of properties were damaged (New Straits Time, 2013). With the increased occurrence of catastrophic incidents in Cameron Highlands over the past few years, the tourism activities has been severely affected (The Star Online, 2013b).

Water and air pollution and illegal waste dumping have always been the major concerns of the country. As a tropical country with high humidity and frequent rain, Malaysia is rich with water resources and blessed with hundreds of rivers. However, due to perennial illegal dumping of industrial waste and debris, livestock waste as well as households' disposal, many rivers have been severely degraded. The DOE reported that almost 41% of rivers in Malaysia (187 rivers of 464 rivers) have been classified as polluted or slightly polluted. In a media report dated 21 October 2012, the

Environmental Forensics Research Centre of University Putra Malaysia revealed that most rivers in Selangor were polluted and that Langat River which is one of the reservoirs, can be considered as a dead river due to a high level of pollution (The Star Online, 2012). In Penang – one of the Malaysia's main industrial hubs, the accumulation of heavy metals over the decades in Juru River has caused a high concentration of metals in the aquatic systems (Idriss and Ahmad, 2013) and the river has been classified as the most polluted river in Malaysia. In other cases, illegal dumping of construction waste and debris on public lands such as residential areas, open areas and roadsides, has been frequently reported by the media, raising serious concerns on the role of companies in the society. Moreover, industrial cities such as Johor Bahru, Penang, Klang Valley and high density cities or urban areas such as Kuala Lumpur and Kuantan are frequently fronting air pollution problems due to the emissions of factories and vehicles. Flash floods also have become a norm in the areas. Although it has been debated over the years, nothing seems to resolve these issues.

Blessed with hundreds of miles of coast lines, Malaysia is a home to abundant coastal resources. Uncontrolled coastal development for bridges, marinas, ports and harbours[16] over the past decade has led to coastal erosion and siltation problems. These problems threaten not only the marine life and fishing industry, but also increase the risks of flooding. In 1986, the National Coastal Erosion Study revealed that about 29% or 1,380 km of the country's coastline are facing erosion problem. Another study conducted in 1994 found that siltation problems affect almost 150 river mouths in Malaysia of which 35 are facing critical siltation. Taking into consideration the fast development of coastal tourism in Malaysia, the rate may increase in time. In other cases, the development of Iskandar Malaysia – the country's first economic growth

[16] The Department of Irrigation and Drainage (DID) http://www.water.gov.my/our-services-mainmenu-252/coastal-management-mainmenu-279/activities-mainmenu-184?lang=en

corridor, which took off in 2006 has reclaimed about 3,237.48ha of land, affecting many people who depend on fishing industry for source of income. As a remedy, the state has regulated that for every each square foot of reclaimed land, the developer has to contribute 30 cent, inflicting a total of RM104 million.

2.1.6.2 Environmental Legislation and Efforts

Environmental Quality Act (EQA) is a federal statue which was enacted in 1974 to specifically govern environmental issues. EQA predominantly relates to the prevention, abatement, control of pollution and enhancement of the environment (Act 127, EQA 1974). An Environmental Division which is currently known as the Department of Environment (DOE) was established in 1975 to address environmental issues according to the EQA 1974. Since it was first enacted, EQA has been amended four times in 1985, 1996, 1998 and 2001. The four-time-amended EQA clearly shows the intensity of the Malaysian government in dealing with environmental issues. Under the EQA 1974, a range of environmental laws have been introduced and are strictly enforced by the DOE (see Figure 2.3).

Control of agro-based water pollution

- Environmental Quality (Licensing) Regulations, 1977
- Environmental Quality (Prescribed Premises) (Crude Palm Oil) Order, 1977
- Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations, 1977, and (Amendment) 1982
- Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Order, 1978
- Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations, 1978

Control of municipal and industrial waste water pollution

- Environmental Quality (Sewage and Industrial Effluents) Regulations, 1979
- Environmental Quality (Prohibition on the Use of Controlled Substance in Soap, Synthetic Detergent and Other Cleaning Agents) Order, 1995

Control of industrial emissions

- Environmental Quality (Clean Air) Regulations, 1978
- Environmental Quality (Compounding of Offenses) Rules, 1978

Control of motor vehicle emissions

- Motor Vehicles (Control of Smoke and Gas Emission) Rules, 1977 (made under the Road Traffic Ordinance of 1958)
- Environmental Quality (Control of Lead Concentration in Motor Gasoline) Regulations, 1985
- Environmental Quality (Motor Vehicle Noise) Regulations, 1987

Control of toxic and hazardous waste management

- Environmental Quality (Scheduled Wastes) Regulations, 1989
- Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order, 1989
- Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Regulations, 1989
- Promotion of Investments (Promoted Activities and Products) (Amendment) (No. 10) Order, 1990 (made under the Promotion of Investments Act, 1986)

Source: UN Economic and Social Commissions for Asia and the Pacific (ESCAP)[17]

Figure 2.3: Environmental Laws and Regulations under the EQA 1974

Of late, the employment of green technology in industrial activities is gradually being emphasised by the government, in conjunction to the country's pledge on reducing carbon dioxide (CO_2) emissions through National Policy on Climate Change. Under the Green Technology Finance Scheme (GTFS), RM1.5 billion has been allocated to provide financial assistance to companies that supply and use green technology. Furthermore, in the New Economic Model (NEM)[18] which was launched in 2010, sustainability has been included as one of the three goals to be achieved in addition to

[17] For further details, see http://www.unescap.org/

[18] NEM aims to transform Malaysia from a middle income to an advanced nation by the year 2020.

inclusiveness and high income. In a related point, a 'green court' has been established in 2012 to specifically address court cases involving environmental issues related to business activities.

From the GLCs standpoint, the introduction of the 'Silver Book'[19] in 2006 clearly demonstrates the impetus of government's effort in promoting a balance in economic-social performance among GLCs. To achieve this, the Book outlines how GLCs can proactively contribute to the society of which includes protecting the environment. In this regard, GLCs are encouraged to minimise the impact of their business activities through the operations, products and services on the environment (PCG, 2006). In 2012, the Silver Book BPN was published to further promote CSR activities by providing practical guidance and case studies for developing and implementing robust CSR programmes (PCG, 2013).

2.1.6.3 Accounting Standards and Professional Accounting Bodies Involvement

Despite the absence of generally accepted accounting standard on ER, the current accounting standards – the MFRS[20] 101 '*Presentation of Financial Statem*ent', MFRS 137 '*Provisions, Contingent Liabilities and Contingent Assets'*, MFRS 6 *'Exploration for and Evaluation of Mineral Resources'* and MFRS 141 *'Agriculture'* make explicit references to ER. For example, MFRS 101 (Paragraph 14) states that the entities, particularly in industries which environmental factors are significant and when employees are regarded as an important user group, may present environmental reports and value added statement as additional reports. MFRS 137 (Paragraph 19) outlines the

[19]The Silver Book is included among the 10 initiatives of GLC Transformation Programme. The initiatives are: 1) enhance Board effectiveness; 2) strengthen directors capabilities; 3) enhance GLIC monitoring and management functions; 4) improve the regulatory environment; 5) clarify social obligations; 6) review and revamp procurement; 7) optimise capital management practices; 8) manage and develop leaders and other human capital; 9) intensify performance management practices; and 10) enhance operational improvement (PCG, 2006).

[20]Malaysian Financial Reporting Standard (MFRS). Although the full convergence with International Financial Reporting Standards (IFRS) commenced on 1 January 2012, starting January 2006, reporting entities in Malaysia had been required to prepare their financial statements in accordance to these international standards.

accounting and disclosure requirements for all provisions, contingent liabilities and contingent assets, including penalties or clean-up costs for unlawful environmental damage, both of which would lead to an outflow of resources embodying economic benefits in settlement regardless of the future actions of the entity. Similarly, an entity recognises a provision for the decommissioning costs of an oil installation or a nuclear power station to the extent that the entity is obliged to rectify damage already caused.

Both MFRS 6 and MFRS 141 concentrate on a specific industry. MFRS 6 specifies the financial reporting for the exploration for and evaluation of mineral resources. Under Paragraph 2 of MFRS 6, disclosures that identify and explain the amounts in the entity's financial statements arising from the exploration for and evaluation of mineral resources is required to help users of those financial statements understand the amount, timing and certainty of future cash flows from any exploration and evaluation assets recognised. Whilst, MFRS 141 (Paragraph IN1 and IN2) prescribes the accounting treatment, financial statement presentation and disclosures related to agricultural activity, including the accounting treatment for biological assets during the period of growth, degeneration, production, and procreation, and for the initial measurement of agricultural produce at the point of harvest.

Local professional accounting bodies and their collaboration with the government are also contributing to the promotion of ER practices amongst Malaysian companies. For example, the Malaysia Sustainability Reporting Awards (MaSRA) and National Annual Corporate Report Awards (NACRA) aim to promote greater corporate accountability on CSR through the publication of informative and factual CSRR or sustainability reporting in the annual reports. The MaSRA (formerly known as Malaysia Environmental Reporting Awards (MERA)) was first launch in 2002 by the ACCA and

endorsed by the DOE. Whilst, the NACRA is a joint-collaboration between the professional bodies of the Malaysian Institute of Accountants (MIA), Malaysian Institute of Management (MIM) and Malaysian Institute of Certified Public Accountants (MICPA).

By far, the mandatory CSRR imposed by the Malaysian government in 2007 demonstrates a larger role plays by the government in promoting CSRR amongst companies. The CSRR mandate is included in the Listing Requirement of Bursa Malaysia (Appendix 9C, Part A, Paragraph 29), requiring all PLCs to disclose "a description of the corporate social responsibility (CSR) activities or practices undertaken by the listed issuer and its subsidiaries or if there are none, a statement to that effect." There are four key dimensions of CSR, namely, community, workplace, market place and environment; in which companies' business goals and strategies are expected to be aligned with in order to create a balance between profit maximization and social contributions. Examples for the contributions to the community include donations to help the underprivileged students, provide infrastructure for youth development, volunteering to restore places of living; contributions to the workplace include fair gender treatment and complying with human and labour rights; contributions to the marketplace include ethical purchasing and sourcing, practicing good corporate governance; and contributions to the environment include initiatives to reduce emissions and/or pollutions, investing in green technology and promote energy efficiency (Bursa Malaysia, 2007). Despite the fact that the CSRR requirement is lack of specific reporting requirements (Alrazi et al., 2009; Zainal et al., 2013), at its simplest, the conveyance of companies' CSR through their philanthropic activities may well uphold the government's green campaign as the 'environment' is part of CSR dimensions.

2.1.6.4 ER Practices in Malaysia

Owing to the green initiatives of the government as well as the professional accounting bodies, there has been an optimistic growth in the number of companies reporting social and environmental information since 2006 (ACCA, 2010a). Despite the increasing number of companies engaging in ER, ER practices among Malaysian companies are still at infancy (Ahmad et al., 2003; ACCA, 2003b; Nik Ahmad and Sulaiman, 2004; Yusoff et al., 2007; Alrazi et al., 2009; Buniamin, 2010). The studies found that most companies reported more narrative and positive environmental information with little emphasis on quantified environmental information. In particular, very little that actually reported their business environmental impacts or environmental performance (Nik Ahmad and Sulaiman, 2004; Yusoff et al., 2007; Alrazi et al., 2009). A relatively low levels of quantified environmental information can be attributed to the fabrication of companies' environmental information to attain legitimacy (Sulaiman and Nik Ahmad, 2006).

Furthermore, it has been affirmed in CSRR literatures that among the CSR aspects, environmental information was the least information reported by companies (Thompson and Zakaria, 2004; Bursa Malaysia, 2007; Amran and Susela, 2008; Said et al., 2009; Mustaruddin et al., 2010; Wan Abdul Rahman et al., 2011; Zainal et al., 2013). Bursa Malaysia (2007) in its study examining CSR practices of PLCs found that there is a lack of awareness on CSR in most PLCs and that data and knowledge on the environment was further limited. Zainal et al. (2013) found that in the subsequent years after the CSRR mandate in 2007 (i.e. 2008 – 2009), the quantity and quality of CSR reporting decreased gradually. Consistent with Alrazi et al.'s (2009) findings, Zainal et al. (2013) also observed that the environmental disclosure in 2006, a year before the mandate, was relatively higher than previously disclosed. These findings exhibit an attempt made by

companies to minimise the potential regulatory costs in relation to CSRR. As far as the mandate is concerned, the incompleteness of reporting is still a major concern due to the relatively lack of specific reporting requirements.

2.1.7 Transparency Issue Related to ER

As mentioned elsewhere in this thesis, until today, there is no generally accepted accounting standard on ER. In terms of discrete regulation, however, some countries such as Denmark, Netherlands, Sweden, South Korea, Japan, Spain and New Zealand have regulated ER as mandatory. Malaysia took a similar approach by requiring all PLCs to report their CSR activities in the annual report with effect from year 2007. On the other hand, for most countries where ER remains as a voluntary practice, there is an encouraging sign of mandatory reporting requirements for certain environmental disclosure related to environmental standards (Lodhia, 2003).

Having discretion over the dissemination of environmental information, companies use different labels for their reporting which resulted in incomparability of ER (Othman and Ameer, 2010). For example, some companies reported their environmental information in a specific section of the annual report labelled as *Statement of Environment*, *Corporate Social Responsibility (CSR)* or *Health, Safety and Environment (HSE),* while some broadly discussed their environmental commitments in various locations, such as Chairman's Letter, Director's Report and Operation Review (Ahmad et al., 2003; Nik Ahmad and Sulaiman, 2004; Alrazi et al., 2009; Othman and Ameer, 2010). Such a variation in ER may reduce the stakeholders' ability to make informed decisions (Zainal et al., 2013).

There also appears to be an inherent problem regarding the incomprehensiveness of ER. Given the points relating to ER highlighted in the previous paragraph, the involvement of accountants in the preparation of environmental information seems to be limited (Lodhia, 2003; Collins et al., 2011). Prior studies found that most companies reported significantly more narrative and positive environmental information with lack of concentration on specific environmental information concerning the environmental impact of business activities and related monetary implications of such information (Hackston and Milne, 1996; Ahmad et al., 2003; Ferreira, 2004; Nik Ahmad and Sulaiman, 2004; Jaffar, 2006; Yusoff et al., 2007; Alrazi et al., 2009; Buniamin, 2010; Bouten et al., 2011). Because of this prevailing nature of disclosure, ER is often viewed as a legitimation tool of companies (Deegan and Gordon, 1996; Hackston and Milne, 1996; Frost and Wilmshurst, 2000; Wilmshurst and Frost, 2000; Ahmad et al., 2003; Campbell et al., 2003; Cho and Patten, 2007; Buniamin, 2010). With such disclosure, it is not clear whether companies reporting their environmental information to reflect their environmental strategies or simply for legitimation purposes (Hopwood, 2009), raising a serious doubt over the credibility of ER as a tool for discharging environmental accountability (Adams, 2004; Owen, 2008; Bouten et al., 2011; Gillet, 2012).

Environmental considerations in business undertakings have garnered widespread attention over the past decade. The stakeholders increasingly demand companies to produce more environmental information (Deegan and Rankin, 1997; Murray et al., 2006; De Villiers and Van Staden, 2010; Mohd Said et al., 2013), resulting in a growing call for accountants to expand their traditional role to embrace environmental and social responsibility (Collins et al., 2011). In particular, the lack of quantified environmental information may confine the stakeholders' decision-making processes as they are not able to link such information with economic variables (Jasch, 2009). In a study

examining the perceptions of Australian stakeholders on the value of environmental disclosure, Deegan and Rankin (1997) found that the shareholders, individuals within organisations, accounting academics and review organisations perceived environmental information as material to their decisions. Similarly, over 80% of the shareholders in the UK, US and Australia demanded environmental information, such as environmental risks and impacts, the environmental policy, performance against measurable environmental targets and environmental costs, to be reported in the annual reports (De Villiers and Van Staden, 2010). In a longitudinal study of environmental disclosures of top 100 UK companies over 9 years (1989-1997), Murray et al. (2006) found that companies with high share price returns reported more environmental information than those of low/medium returns, suggesting that environmental information is paramount to stakeholders' decision makings. In a study conducted by Mohd Said et al. (2013) which sought to examine the usefulness of environmental information among Malaysian fund managers, a combination of narrative, quantitative and monetary form of environmental information was perceived as being the most important by fund managers in lending decisions. More recently, Allet (2014) found that being socially responsible is the main driver for microfinance institutions to embark in proactive environmental strategies. These include screening loans based on environmental criteria, offering microcredit to support green technologies and training clients on pro-environmental practices.

The fundamental premise behind organisational change is that any company needs to undergo a transformation of corporate strategies and culture to support the change (Gray et al., 1995a; Tilt, 2006). In this regard, in addressing environmental concern, the role of accounting is deemed crucial (Ball, 2005, 2007; Gray, 2010). More specifically, the integration of environmental issues in companies' business decisions will create a better

sense of responsibility towards the environment since it allows companies to monitor their environmental performance and consequently enable them to make informed decisions (Schaltegger and Burritt, 2000; Burritt, 2002). Companies are also able to report relevant environmental information to the stakeholders. The importance of accounting in enhancing companies' environmental undertakings, especially on the daily business decisions as well as reporting, has been manifested by the development of EMA. This will be discussed in the next section.

2.2 Environmental Management Accounting (EMA)

This section discusses the various definitions of EMA, its contexts as well as factors influencing its implementation. A discussion on EMS is also offered as there is, sometimes, confusion between EMA and EMS given both are environmental management tools related to environmental performance. It is of importance to highlight the difference, especially in the present study where EMS constitutes one of the plausible factors that drive EMA implementation.

2.2.1 What constitutes EMA?

The International Federation of Accountants (IFAC) in its *International Guidance Document: Environmental Management Accounting* defines EMA as,

> …the management of environmental and economic performance through the development and implementation of appropriate environment related accounting systems and practices… may include reporting and auditing in some companies (IFAC, 2005, p.19).

In the same document, a complementary definition of EMA is offered by the United Nations Expert Working Group on EMA where EMA is,

> …the identification, collection, analysis and use of two types of information (monetary and non-monetary) for internal decision making (IFAC, 2005, p. 19).

Prior studies have described EMA as the identification, allocation, generation and use of physical and monetary environmental information to support business decision making that can drive towards sustainable business (Bartolomeo et al., 2000; Frost and Wilmshurst, 2000; Bennett et al., 2002b). In a more comprehensive term, EMA is an integrated system which combines data from financial accounting, cost accounting and material flow balances to increase material efficiency, reduce environmental impact and risk and reduce costs of environmental protection (Jasch, 2003, p. 668).

The absence of a standard definition of EMA, apparently, has led to the emergence of diverse terminology. According to IFAC (2005), EMA is sometimes referred to as environmental accounting, environmental cost accounting (ECA), full cost accounting (FCA) and total cost assessment (TCA). Based on the above discussion, EMA in the present study is referred to as an internal accounting process that measures business environmental impacts, in terms of physical and monetary.

2.2.2 The Contexts of EMA

The US Environmental Protection Agency was the first to formally promote EMA implementation in the early 1990s (Jasch and Savage, 2009). Later, issues concerning EMA implementation have been spurred by meetings and publications of *Expert Working Group on EMA* of the United Nations Division for Sustainable Development (UNDSD) (Jasch and Savage, 2009). Inspired by much interest on EMA implementation, a guidebook to EMA has been published by IFAC in 2005.

On a global scale, IFAC has taken a proactive effort in offering assistance to companies concerning sound environmental management guidance through the *International Guideline Document: Environmental Management Accounting.* The guidance

predominantly focuses on manufacturing sector given such business environment requires periodic supervisions largely on its environmental impacts. However, in accomplishing companies' environmental goals, the guidance is mutually benefiting all business sectors. This is because, all business sectors generate waste and emissions. The consumption of natural resources such as energy, water and paper for documentation is common in all type of business activities. Unless steps are taken to effectively manage the consumption, the inefficient use of these resources may lead to waste generations and emissions (IFAC, 2005).

Besides the general guideline to EMA produced by IFAC, there have been several developments of specific physical aspect of EMA. For example, pioneered in the Germany, the *Material Cost Flow Accounting (MCFA)* was adapted by the Ministry of Economy, Trade and Industry (METI) of Japan to provide assistance for companies to improve decision making in wastes minimisation (Kokubu and Nakajima, 2004). The idea of MCFA later was engrained in the latest ISO standard: ISO14051 *(Environmental Management – Material Flow Cost Accounting (MCFA))* issued in 2011. The standard offers a framework that assist companies to reduce their business environmental impacts including environmental-related costs.

More recently, there has been an increasing interest in quantifying the carbon footprint of an organisation, owing to the growing concern on greenhouse emissions. Carbon foot-printing can be described as "a certain amount of gaseous emissions that are relevant to climate change and associated with human production or consumption activities" (Wiedmann and Minx, 2008, p. 2).

In the present study, the focus is on examining the extent of EMA implementation relating to the generation and use of physical and monetary environmental information, without any specification on specific development of physical aspects of EMA. This is primarily because EMA is relatively new in Malaysia. Consequently, this creates doubt as to whether companies in Malaysia would narrow their environmental uptakes into specific procedures.

2.2.2.1 Types of EMA Information

EMA constitutes two types of environmental information, namely, physical and monetary. Physical environmental information can be defined as information on the flow of energy, water, materials and wastes, or in other words, the business environmental impact (in physical units) such as the total amount of fresh water consumed, the volume of wastes generated, the amount of materials used, and the amount of energy consumed (Burritt et al., 2002; IFAC, 2005). Monetary environmental information relates to environmental costs and earnings which include waste and emission control costs, environmental research and development costs, sales from scrap and wastes, recycling subsidies and tax incentive on green equipment (IFAC, 2005). Monetary environmental information can also be referred to as the monetised of physical environmental information. Overall, physical and monetary environmental information are of the same concept and are the accessed environmental impacts of companies' product and services, but differ in terms of the way the information is presented. Both physical and monetary environmental information facilitate the identification of the size and effect of companies' environmental impacts (Sulaiman and Nik Ahmad, 2006), including for compliance purposes (Schaltegger and Burritt, 2005; Gale, 2006; Epstein, 2008; Jalaludin et al., 2011).

2.2.2.2 Environmental Costs

Measuring environmental costs can be considered as the primary attention in EMA with physical environmental information allows the quantification of such values (Bennett et al., 2002b; Jasch, 2009). These costs are categorised into internal and external costs (Jasch, 2003; De Beer and Friend, 2006; Jasch, 2009). Internal costs are costs that are directly related to the product and/or services (Jasch, 2003) such as cost of wastes, land rehabilitation costs and R&D expenditure on green initiative where companies are directly liable for these costs (De Beer and Friend, 2006). On the contrary, external costs or usually referred to as externalities[21] are costs that companies are not legally accountable for because they are financially immeasurable (Jasch, 2003; De Beer and Friend, 2006; Jasch, 2006; Crowther and Aras, 2008; Jones, 2010). For example, irresponsible business activities are likely to degrade the environment. In this case, instead of the polluting companies, the society pays the price, in terms of declining health condition, physical discomfort and imbalanced ecosystems. Although these impacts are often to be visible in the long term, sometimes, they can be immediate. Globalisation, in part, causes business activities to become more sensitive to the environment due to constant expansion and complexity. In this sense, business expansion requires a new or bigger location, new product, more resources and new marketing strategies. All this has an impact on the environment and the society, directly or indirectly. Thus, to minimise the externalities, environmental regulations and standards are being imposed in such a way to internalise these externalities via penalties or fines.

There is also an attempt to incorporate externalities in companies' decision making via full cost accounting (FCA). According to Bebbington et al. (2001), one of the

[21] Externalities can be either in terms of positive or negative (Beaver, 1989; Crowther and Aras, 2008). However, more concerns are placed over the negative externalities because of the adverse impacts they have on the environment and the society. Thus, requiring companies to be responsible over their externalities would denote the negative externalities.

constraints that impede the efforts to alleviate the negative business environmental impacts is the ambiguity in the extent and causes of unsustainability. FCA comes into play to address this uncertainty. FCA is defined as "a system that allows current accounting and economic numbers to incorporate all potential/actual costs and benefits into the equation including environmental (as perhaps, social) externalities to get the price rights" (Bebbington et al., 2001, p. 8). Pre-requisites to the development of FCA are life cycle analysis, eco-balances and ecological footprints. In brief, FCA aims to monetise the negative externalities (Jones, 2010). Although both FCA and EMA focus on identifying and measuring environmental information, they are different in such a way that FCA emphasises on environmental costs (monetary environmental information), while EMA accentuates on both monetary and physical environmental information (UNDSD, 2002).

Apart from the broad distinction between internal and external environmental costs, IFAC (2005) further categorised environmental costs into at least six cost categories (see Figure 2.4). Cost category 1 usually reflects in manufacturing industry where there is always a possibility of the products to have environmental impacts when they leave the manufacturer. The example given is the post effect of the product following its disposal to the landfill at the end of the products life. By knowing the potential effect, companies may think of the alternative way to minimise the effect, for example, by replacing the material into less-toxic material. For non-product outputs (cost category 2), the amount of wastes and emissions (and cost associated) from producing the product (for non-product industries, all material inputs such as paper, water and energy) will facilitate companies in overseeing their environmental impacts. With the information, companies may opt to purchase equipment that generates less waste water per unit product output.

Type of Cost	Examples
1. Materials Costs of Product Outputs Includes the *purchase costs* of natural resources such as raw materials, water (if water becomes the final product) and other materials that are converted into products, by-products and packaging.	▪ Raw material cost ▪ Packaging material cost ▪ Water consumption cost
2. Materials Costs of Non-product Outputs (NPO) Includes the purchase (and sometimes processing) costs of energy, water and other materials that become NPO (e.g. waste and emissions).	▪ Material costs (materials that become NPO) ▪ Operating material ▪ Energy and water consumption costs
3. Waste and Emission Control Costs Includes costs for: handling, treatment and disposal of Waste and Emissions; remediation and compensation costs related to environmental damage; and any control-related regulatory compliance costs.	▪ Depreciation of biological assets/ maintenance costs ▪ Taxes, insurance, permits ▪ Internal and external personnel – e.g. salaries, consultation fees
4. Prevention and Other Environmental Management Costs Includes the costs of preventive environmental management activities such as cleaner production projects. Also includes costs for other environmental management activities such as environmental planning and systems, environmental measurement, environmental communication and any other relevant activities.	▪ Similar to cost category 3 but this category deals with preventive measures: o green purchasing o eco-system management o EMS implementation
5. Research and Development Costs Includes the costs for Research and Development projects related to environmental issues.	▪ Development cost of energy-efficiency products
6. Less Tangible Costs Includes both internal and external costs related to less tangible issues.	▪ Contingent liability for non-compliance, legal cost and productivity, future regulation, externalities.

Source: Adapted from IFAC (2005)

Figure 2.4: Environmental-related Cost Categories

Generally, cost category 2 is much higher than cost category 3 to 5. Cost category 3 deals with compliance and/or handling cost related to waste and emissions control initiatives. Meanwhile, cost category 4 and 5 concern with contingent environmental costs. Cost category 4 measures preventive actions undertaken to avert negative

business impact (e.g. EMS adoption, governmental lobbying, ER practices), while cost category 5 includes research and development expenses related to environmental aspects (e.g. green technology). Finally, cost category 6 is costs that less visible in company's information systems but are significant in company's going concern. Examples for this type of cost include contingent liability (i.e. fines), potential regulatory cost and negative externalities.

2.2.3 Uses and Benefits of EMA

Contrary to popular belief, the implementation of EMA does not require companies to install a completely new accounting system (Sulaiman and Nik Ahmad, 2006). Instead, it should be an integral part of the existing MAS (Jasch and Savage, 2009). This is because, EMA and conventional management accounting offer almost a similar function (Jasch and Savage, 2009), which is to assist companies' internal decision making processes. Thus, the existing MAS can be upgraded by integrating environmental issues. For example, the adaption of the current accounting system to account for environmental information can be accomplished "by assigning a digit in an account code to identify a cost as an environmental cost" (Sulaiman and Nik Ahmad, 2006, p. 44). Nonetheless, the costs of maintaining the effectiveness of the system are entailed to be incurred (Sulaiman and Nik Ahmad, 2006).

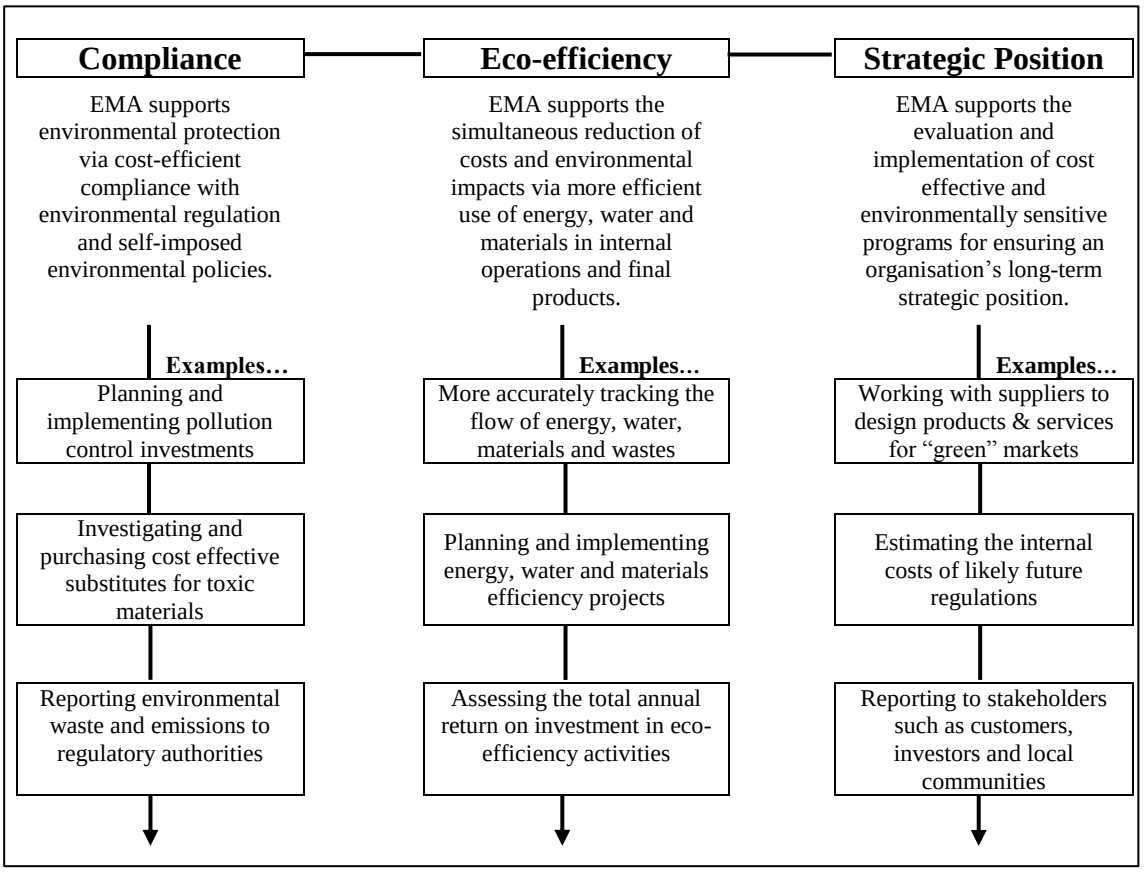
Despite the similarity of EMA and management accounting, the former emphasises on measuring the hidden induced environmental cost of a finished product and/or service (Sulaiman and Nik Ahmad, 2006). This hidden cost is usually lumped in the overhead costs and treated as indirect cost of the product and/or service in the conventional management accounting (Burritt, 2004; De Beer and Friend, 2006; Jasch, 2009; Raiborn et al., 2011). Gale (2006) in a study ascertaining the environmental costs of a Canadian

paper mill found that many important environmental costs are hidden and not recognised in corporate decision making. What most companies seem to overlook is that the measurement of this hidden cost would actually result in cost savings through the identification, assessment and allocation of environmental and material flow costs (Sulaiman and Nik Ahmad, 2006; Jasch and Savage, 2009). Burnett and Hansen (2008) found that proactive environmental management help companies in the US electric utility industry to reduce their environmental costs. In another case study, Burritt et al. (2009) reported that with the support of EMA, the emission reduction project in a Philippine rice mill which aimed to eliminate the need for burning and dumping of husks has been successfully implemented. In particular, through environmental investment appraisal, the company was able to determine the potential waste reduction options as well as the potential revenues from selling the CERs (certified emissions reductions)[22]. In a more recent study, Sulong et al. (2014) found that the implementation of MFCA, which is one of the EMA tools, in five small–medium enterprises (SMEs) in Malaysia has helped the companies achieved simultaneous economic growth and environmental sustainability.

Accordingly, at least three main categories in which EMA uses and benefits can be of relevance, as identified by IFAC (2005). They include compliance, eco-efficient and strategic position purposes (see Figure 2.5). Consistent with IFAC (2005), Epstein (2008) accentuates that when corporate strategy is aligned with environmental performance, companies can flexibly respond to regulations, and at the same time, benefit from such action. For example, a zero-waste strategy eliminates costs for site clean-up and can help to improve the productivity. In any case, without performance

[22] The CERs can be sold to industrialised countries and Eastern European countries to help them comply with their quantified GHG emissions reduction commitments (Burritt et al., 2009).

measurement, it seems impossible for companies to meet the regulatory requirements as companies need to adhere to certain benchmark.



Source: Adopted from IFAC (2005, p. 24)

Figure 2.5: Uses and Benefits of EMA

In addition, EMA warrants the efficient or ethical use of natural resources (IFAC, 2005). Particularly, EMA makes information concerning companies' environmental performance available on regular basis and this helps companies to track and improve their resource allocation. As such, it helps to maintain the ecosystems and usually this constitutes cost savings. Meanwhile, strategic position can vary between companies, depending on the nature of business and impact of business activities on the environment (IFAC, 2005). Moreover, in a globalised business environment, companies are forced to make accurate decisions in order to remain competitive and that a systematic yet flexible process to support the decision making in called for. In terms of

environmental strategies, EMA helps companies create a long-term strategic position in conformity to their business circumstances through the communication with the stakeholders and suppliers (IFAC, 2005).

To add to the aforementioned benefits, EMA also facilitates the execution of an EMS as the system requires quantified environmental information to be effective (Jasch, 2009; Ribeiro and Aibar-Guzman, 2010). There, however, appears to be some confusion on EMA and EMS as both related to internal environmental management practices. The subsequent section deliberates further on EMS.

2.2.3.1 Environmental Management System (EMS)

On a global scale, since the Rio Declaration in 1992, many other initiatives related to the environment and sustainable developments have been taken. One of the initiatives related to environmental management is the introduction of EMS. An EMS is a transparent and systematic process used to evaluate and implement companies' environmental goals, policies and legal compliances (Steger, 2000; Welch et al., 2002; Bansal and Hunter, 2003). It provides assistance to companies in minimising and/or controlling waste and pollution (Melnyk et al., 2003) by "integrating sustainability into development assistance to ensure that environmental impacts are assessed and managed" (Keen and Sullivan, 2005, p. 628), allowing companies to respond to the stakeholders' demand more effectively (Perkins and Neumayer, 2010) so as to minimise their environmental contingent liabilities (Hibiki and Arimura, 2011). The adoption of an EMS by companies is voluntary and that the system is tailored to the specific environmental targets of a company.

An international standard related to EMS has been published by the International Organisation for Standardization (ISO) in 1996 and is referred to as ISO 14001. The second edition of the standard (after amendment) was later published in 2004. The standard "helps organisations both to manage better the impact of their activities on the environment and to demonstrate sound environmental management" (International Organisation for Standardisation [ISO], 2009, p. 6). To ensure the EMS is properly implemented and maintained, another standard, ISO 19011 – the ISO auditing standard (also known as EMS audit) is of use (ISO, 2009). Since its first publication, ISO 14001 has been adopted as national standard by more than half of 160 countries (ISO, 2009).

Despite the fact that a considerable number of companies have been using the ISO 14001 standard as a cornerstone of their environmental strategies (Epstein and Roy, 2003), the adoption of such voluntary standard seems to be driven by the need for corporate competiveness or image enhancement especially those in regional markets (Tan, 2005). In particular, ISO 14001 adoption is viewed as an investment to be recognised by the stakeholders (Welch et al., 2002), in such a way that companies with environmental issues may use the adoption to restore their negative image (Bansal and Hunter, 2003). However, in contrast to their argument, Welch et al. (2002) found that there is no significant effect of competitiveness on companies' decision to adopt the standard. Likewise, Bansal and Hunter (2003) in their study examining 197 facilities with certified ISO 14001 found that companies adopted the standard primarily to improve their environmental strategies given that those companies with the standard have clean image. They further contend that seeking for environmental differentiation could be less explained by the ISO 14001 adoption.

Given the basic premise of an EMS is to assist companies in developing sound environmental management practices, several previous studies have been undertaken to empirically examine the relationship between EMS adoption and companies' environmental performance. For example, Melnyk et al.'s (2003) study on a sample of 1150 U.S. manufacturing companies revealed that the adoption of ISO 14001 was positively associated with companies' environmental performance through waste minimisation. The EMS offers companies with specific information for critical function in which without a formal EMS, informed decisions on companies' environmental uptakes cannot be made (Melnyk et al., 2003). Using a case study approach of two Swedish municipal local authorities, Noren and Von Malmborg (2004) found that the environmental management of the municipals improved after the implementation of ISO 14001. In another study, Arimura et al. (2008) examined 792 Japanese manufacturing companies concerning the effect of ISO 14001 adoption on the reduction of business environmental impacts on natural resource use, solid waste generation and wastewater effluent. The findings suggest that the adoption of ISO 14001 helped companies reduce their impacts on natural resource use and solid waste generation. Using a data on manufacturing companies for 2002 – 2008, Nishitani et al. (2012) found that the ISO 14001 adoption resulted in environmental impacts minimisation and productivity improvement. However, it has been emphasised that the effect of implementing an EMS on productivity is rather conditional. That is, if there are other activities designed concurrently to improve productivity, the effect of EMS adoption is hidden by the effects of these activities. Consistent with many studies, Russo (2009) in a longitudinal study (from 1996 to 2001) of 242 electronic manufacturing facilities, found that the ISO 14001 adoption was associated with lower emissions.

Despite the benefits of EMS adoption in enhancing companies' environmental performance, the effectiveness of the system in this respect is still debatable. The underlying reasoning is that the system only focuses on reaching legal compliance without offering ways to measure continual improvement (Comoglio and Botta, 2012). This argument seems to echo earlier findings of Russo and Harrison (2005) and Gomez and Rodriguez (2011) that the ISO 14001 adoption did not result in better environmental performance. Russo and Harrison (2005) found that the adoption of the standard was associated with greater emissions and that the result provides evidence on the exploitation of the standard to restore companies' negative image. In addition, Gomez and Rodriguez (2011) reported that there was no statistical difference in the Toxics Release Index of 56 certified companies with the Index of 70 non-certified companies as far as the environmental performance is concerned, suggesting that the standard did not have an added value.

From the experience of Malaysian companies, Tan (2005) reported that companies obtained the ISO 14001 to achieve improved environmental performance and as well as corporate image. However, due to a small sample size, the generalisation of the results is rather limited. In another study by Goh et al. (2006), enhanced corporate image was perceived as the strongest determination of the manufacturing companies to adopt ISO 14001. Moreover, consistent with Tan (2005), the accreditation is positively associated with companies' economic and environmental performance. Using a sample of 61 SMEs, Goh and Abdul Wahid (2010) found that the ISO 14001 adoption improves SMEs operation and business performance. Despite the positive association between EMS adoption and corporate performance, Abdullah and Chan (2010) found that there were still many companies resisting to adopt an EMS due to the intention to maintain

their status quo, uncertainty in environmental issues and past failure experience of EMS implementation.

Overall, an EMS is about having a framework to govern companies' environmental uptakes which seeks to minimise business environmental impacts and increase environmental performance, based on the companies' goals and targets. EMA, on the other hand, is an MAS that measures physical and monetary the environmental information.

2.2.4 EMA Implementation and Corporate Characteristics

EMA is relatively a new branch of accounting but emerging (Gray et al., 2001). Due to such attribute, the management is expected to play a significant role in determining the success of its implementation (Zutshi et al., 2008), particularly as such implementation requires "a team effort". That is, various expertise other than the accountants, such as the production managers, engineers and lawyers, is essential before an informed decision can be made (Bartolomeo et al., 2000; Burritt et al., 2002; Epstein and Roy, 2003; Keen and Sullivan, 2005; Sulaiman and Nik Ahmad, 2006; Epstein, 2008).

Previous studies have demonstrated that the implementation of a new system is a very challenging process as it entails a change in the status quo of the companies' culture (e.g. Miller and O'Leary, 1994; Chen et al., 2009; Kim and Kankanhalli, 2009). From the perspective of environmental commitment, Roy et al. (2001) contend that a change towards being environmentally responsible can be realised from a sound management practices of which accounts for a mutual beneficial relationship between the management and the employees as well as the suppliers. In this regard, the formulation of effective sustainability or environmental strategies can be sanctioned through sound

performance evaluations and rewards systems coupled with the support from the people within the company (Epstein, 2008).

Perhaps owing to the lack of management commitment on environmental management practices, Bartolomeo et al. (2000) found that many European companies only run EMA as experimental projects, instead of, a comprehensive implementation. Moreover, the implementation was part of the companies' due diligent process, which has led to the low level and variation of EMA implementation among companies. Burritt and Saka (2006), in their case studies of several Japanese companies in oil, manufacturing and IT industries observed that the absence of a standardised approach for analysis and comparison of business/product eco-efficiency[23] has led to the underutilised of EMA information in eco-efficiency measurement. In Australia, the uncertainty on environmental accounting was reported to be the main contributing factor to the low implementation of environmental cost accounting practices by Australian companies (Parker, 2000). In the context of Malaysia, Jalaludin et al. (2011) found that the EMA implementation among manufacturing companies was very low.

While concern on the low level of EMA implementation remains, a number of EMA research observed that such an implementation has varied among companies (e.g. Frost and Wilmshurst, 2000; Frost and Seamer, 2002; Ferreira et al., 2010; Ribeiro and Aibar-Guzman, 2010; Christ and Burritt, 2013). There is, however, relatively little discussion on the theoretical underpinning for the EMA implementation (Bouma and Van der Veen, 2002), although within the abovementioned literature, corporate characteristics such as environmental sensitivity of industry, company size and environmental standard have been linked to such implementation.

[23] Eco-efficiency is the ratio between the change in value (monetary) and change in environmental impact added, requiring both physical and monetary environmental information (Burritt and Saka, 2006).

Past management accounting studies have shown that the role of corporate characteristics in the implementation of MASs is a powerful one (Ezzamel, 1990; Fisher, 1996; Chenhall, 2003; Abdel-Kader and Luther, 2008; Cadez and Guilding, 2012). For instance, size has been found to affect the design of MASs where larger companies use more sophisticated systems (Ezzamel, 1990; Chenhall, 2003; Abdel-Kader and Luther, 2008; Cadez and Guilding, 2012) and that tend to introduce non-financial measures (Hoque and James, 2000). Besides size, environmental uncertainty[24] (Fisher, 1996; Chenhall, 2003; Abdel-Kader and Luther, 2008) and corporate strategy (Cadez and Guilding, 2012) were also found to be major explanatory variables for the variations of MASs. As EMA is part of MASs and that accounts for non-financial measures, for the purpose of the present study, the extent of EMA implementation among Malaysian companies will be discussed in light of contingency theory.

2.2.4.1 Contingency Theory

Evolved in the 1960s, contingency theory remains as a central theory in management research until today. The theory emphasises that there is no universally design of MASs for all companies, rather it will depend on the circumstances surrounding the companies (Otley, 1980, 1999). These include company size, environmental uncertainty, production technology, corporate strategy and market environment (Chenhall, 2003; Hoque, 2004; Abdel-Kader and Luther, 2008). More precisely, the design of each company's MASs will likely be tailored by these contingent variables.

Another key concept in contingency theory is the operationalization of contingent fit. Based on the contingent fit argument, there are three approaches: selection, interaction and systems; of which these will shape the design of a contingency-based study (Drazin

[24] Environmental uncertainty is a situation where there is a lack of information regarding environmental factors which may limit the ruling of possible outcomes of a specific decision (Fisher, 1996), for example, government regulations, globalisation, customers' demand (Hoque, 2004).

and Van de Ven, 1985). The selection approach examines the association between contingent variables (or contextual factors) with aspects of MAS (or structural variable) without attempting to assess its link with companies' performance (Drazin and Van de Ven, 1985; Chenhall, 2003). The interaction approach examines the effect of contingent variables and MAS on companies' performance (Drazin and Van de Ven, 1985), where the contingent variables act as moderator (Chenhall, 2003). The systems approach considers multiple contingencies factors and MAS simultaneously to find ways to enhance performance (Drazin and Van de Ven, 1985; Chenhall, 2003). For the purpose of the current study, the selection approach is used to explore the influence of contingent variables on the extent of EMA implementation.

2.2.4.2 Contingent Variables – Corporate Characteristics

The application of contingency theory in EMA research is relatively underdeveloped (Bouma and Van der Veen, 2002; Qian et al., 2011). Parker's (1997) study was the first published work to apply contingency theory to examine the significance of accounting in corporate environmental strategy. The findings of the study suggest that the development of EMA is contingent upon environmental strategy. In a case study of the New South Wales local governments' EMA practice relating to waste management, Qian et al. (2011) found that the development of EMA was associated with organisational context such as complex waste operations and service designs, changes and uncertainties in waste and recycling management and the council's strategic position for waste management, consistent with contingency arguments. Their study also found that the institutional pressures such as the regulatory pressures from different environmental regulatory bodies, environmental expectations from local communities and pressures from peer councils; were significantly associated with EMA development.

Likewise, Christ and Burritt (2013) applied contingency theory in a study examining the present and future use of EMA among practicing accountants in Australian companies. Using Ferreira et al.'s (2010) measure of EMA use, the study found that EMA use was associated with environmentally sensitive industries, large-sized companies and environmental strategy. Environmental strategy was measured by way of the extent to which environmental concerns were incorporated into the corporate strategic planning process. These include linking environmental objectives with corporate goals and taking environmental impact reduction into consideration in measuring the quality of product.

Despite the limited reference to contingency theory in prior EMA research, some of the contingent variables such as environmental sensitivity of industry, company size and business strategy have been discussed in relation to factors influencing EMA implementation. The discussion was based on describing the current state of implementation, parallel with selection approach of contingency fit. For example, Frost and Wilmshurst (2000) in their study examining the level of EMA adoption among Australian companies, found that environmental sensitivity of industry did not influence the adoption of EMA. Ferreira et al. (2010), using a survey approach, postulated that business strategy, product and process innovations are associated with EMA use. It is suggested that the effective and efficient use of available resources will help companies to minimise waste generation, emission and conserve natural resources, which in turn may result in improve corporate financial performance and corporate competitive advantage. However, no significant associations were found between EMA use and business strategy, and between EMA use and innovations, but, companies in environmentally sensitive industries, namely, chemical, mining and smelting, displayed a greater use of EMA. Ferreira et al. (2010) treated these industries as a control variable

and by implication, EMA is likely to be regarded to be routine in these industries and less of an innovation.

Frost and Seamer (2002) observed that companies in environmentally sensitive industries: coal, mining, water, energy, detergent and pesticides (chemicals); developed a greater extent of environmental accounting practices. They also found that such accounting practices were highly associated with the execution of EMSs and company size. Consistent with Frost and Seamer (2002), Ribeiro and Aibar-Guzman (2010) also found that company size and the extent of environmental management practices influenced the level of environmental accounting development of Portuguese local entities.

Drawing on prior literature on CSRR and ER, the present study also incorporates two other contingent variables, namely, ownership status and the proportion of NED. Both variables are related to organisational effectiveness and can potentially determine the extent of EMA implementation. Ownership of companies in Malaysia can be broadly segmented into GLCs and non-GLCs. GLCs are distinct in nature where they receive special privileges from the government (PCG, 2006). GLCs also dominate main sectors in the country including utilities, telecommunication and financial services, and that hold 36% of the market capitalization of Bursa Malaysia. Along with the GLC Transformation Programs, the Silver Book has been introduced. The Book provides a guideline for GLCs to contribute to the society by encouraging the implementation of specific management accounting tools to measure the performance. Overtly, a greater implementation of EMA to account for GLCs' environmental performance is expected given the failure of conventional accounting systems to support the measurement of environmental information (Burritt et al., 2002; Schaltegger et al., 2003; Burritt, 2004).

Prior studies have shown that companies that are politically supported by the government are more likely to be seen as legitimate to reflect its 'accountability' and 'visibility' (Cormier and Gordon, 2001; Amran and Susela, 2008; Said et al., 2009; Wan Abdul Rahman et al., 2011). Nevertheless, Ribeiro et al. (2012) in their study examining the development of environmental management practices (e.g. environmental department, EMS implementation and the development of environmental control mechanisms) in Portuguese local entities found that the city councils tend to have a greater degree of development of environmental management practices compared to municipal companies, although the difference is not statistically significant. Municipal companies are public companies owned by the city councils. However, unlike city councils, they are subjected to the regulatory accounting framework applicable to private businesses and often compete with private businesses for a market share (Ribeiro et al., 2012).

On the other hand, the assertion that NEDs carry an external view which is significant in safeguarding the interest of the stakeholders (Haniffa and Cooke, 2005; Brammer and Pavelin, 2006, 2008; Said et al., 2009) signals the potential influence of NEDs on EMA implementation. Given the growing concern for business environmental impacts, companies with a larger number of NEDs in the board are having more pressure to engage in environmentally responsible activities. This is especially true in today's rapidly changing business environment where companies eagerly looking for ways to remain competitive. Moreover, there are case studies that found how EMA techniques can contribute to the long term companies' decision makings (see Gale, 2006; Burnett and Hansen, 2008; Burritt et al., 2009).

In relation to ER practices, prior findings, however, suggest that the proportion of NEDs has no significant association although it has led to greater ER engagement (Haniffa and Cooke, 2005; Brammer and Pavelin, 2006, 2008; Said et al., 2009). This could be due to the role of NEDs which is more towards balancing a company's profit maximisation with stakeholders' interests, instead of daily business activities. Nonetheless, given how EMA can improve companies' long term decision makings along with corporate image in this respect, the more the NEDs on the board, the more pressure they put on companies' environmental commitment, and the greater the EMA implementation is as it is the only way to manage the environmental performance.

Table 2.4 provides the meta-analysis of selected prior studies on EMA implementation.

Table 2.4: Meta-analysis of Selected Prior Studies on EMA Implementation

No.	Authors	Sample	Research approach	Results
1.	Bartolomeo et al. (2000)	84 companies in Germany, Italy, the Netherlands and the UK – in chemicals, pharmaceuticals, energy and printing	Postal questionnaire and 15 case studies	▪ There was a moderate but growing interest in EMA. ▪ Small majority of companies in the survey had formal environmental policy, but more than half of the companies had an EMS and environmental personnel. ▪ Companies emphasised more on pollution control and that allocation of environmental costs was limited. Moreover, most companies focused on short-term decision making. ▪ Diverse source of information within countries: - in the US, the main source of environmental costs is both financial and management accounting systems - in Europe, the main source of environmental costs is operational management systems ▪ The measurement of externalities was less significant due to: additional time/work to generate the information and less interest on externalities itself. ▪ Uncertainty on the reliability of environmental cost data as the measurement requires the derivation of data from other parameters. Thus, the margin of error is of concern, especially there is lack of standardization in techniques. ▪ Overall, the implementation of EMA was on a few isolated experimental projects as part of their `due diligence' processes
2.	Frost and Wilmshurst (2000)	121 Chief Financial Officers (CFO) of Top 500 Australian listed companies	Postal questionnaire	▪ In comparison between companies in environmental sensitive and less sensitive industries, a significant difference was found for EMA implementation on items related to the former such as site contamination and rehabilitation. For items related to general environmental issues such as energy, waste and recycling, no significant different was found. ▪ Companies in environmental sensitive industries are more aware of environmental costs due to the nature of their business activities. ▪ Environmental sensitive industries also associated with a greater implementation of environmental audit. ▪ Overall, the level of EMA adoption was limited.

Table 2.4, *continued.*

No.	Authors	Sample	Research approach	Findings
3.	Frost and Seamer (2002)	35 managers of New South Wales public sector entities	Postal questionnaire and content analysis of corporate annual report ("word" count)	▪ Half of the respondents' companies have developed environmental policy ▪ Environmental sensitive industries and public- funding companies are significantly associated with the extent of environmental disclosure ▪ With regard to the development of EMS practices, there is a positive association with environmental sensitive industries and large-size companies.
4.	Masanet-Llodra (2006)	A company in ceramic tiles sector – environmentally sensitive industry and highly regulated industry	In-depth case study	▪ The development of environmental indicators to support the balance scorecard of the company suggests that EMSs improve business management. ▪ However, it is found that the company does not show any interest in disclosing any environmental information in the annual report. ▪ Though the company assumes that environmental disclosures mean a real commitment with its stakeholders and that it proclaimed to be keen to disclose environmental information as an essential part of its EMSs, the facts revealed that the company's environmental disclosing procedure is restricted to particular responses to individual demands instead of providing general information, without considering environmental disclosure in annual reports. ▪ The trend of the company's environmental investments corroborates the firm's general strategy
5.	Kokubu and Nashioka (2008)	75 headquarters and 255 sites in manufacturing sector	Postal questionnaire	▪ For manufacturing sites, the development of environmental accounting was driven by the need to send data to their headquarters. ▪ Of 75 companies, those that emphasise external information disclosure purposes outnumber those that emphasise internal management. ▪ Most of the manufacturing sites whose headquarters adopted environmental accounting are obliged to collect environmental accounting data - to follow MOE guidelines which focus on external disclosure.

Table 2.4, *continued.*

No.	Authors	Sample	Research approach	Findings
6.	Ribeiro and Aibar-Guzman (2010)	62 companies – 11 municipal companies and 51 city councils	Postal questionnaire	▪ The extent to which environmental issues are integrated into the accounting system is low. ▪ The existence of compulsory environmental accounting standards is not positively associated with the development of environmental accounting practices. ▪ Both company size and the degree of development of environmental management practices have a positive and statistically significant association with the level of development of environmental accounting practices.
7.	Burritt and Saka (2006)	6 Japanese companies	Case studies	▪ As there is no generally accepted format as a basis for analysis and comparison of business or product eco-efficiency in Japan, leading companies have developed their own ecological-efficiency and eco-efficiency indicators. ▪ Therefore, the variation in EMA practices indicates that there is a need for further promotion of EMA and the concept of eco-efficiency.
8.	Burritt et al. (2009)	Oliver Enterprises – A rice milling business in the Philippines	Case study	▪ Besides aiding the managers to reduce the environmental and social impacts, the implementation of EMA through the identification, collection, analysis and use of physical and monetary environmental information assists the management in long run decision- making. ▪ The potential revenues derive from the cleaner production (CP) technologies motivates the owners of the rice mill to invest in green power plant. ▪ The EMA results also assist in the development of policy towards greenhouse gas emissions and their reduction .
9.	Ferreira et al. (2010)	40 management accountants/financial controllers of Australian listed companies	Postal questionnaire	▪ On average, the use of EMA was low. ▪ Through EMA use, the respondents perceived the benefit of identifying new opportunities at a relatively high level. ▪ There is no relationship between EMA use and product innovation and size.

Table 2.4, *continued.*

No.	Authors	Sample	Research approach	Findings
				▪ The relationship between EMA use and industry is statistically significant. Companies operating in the chemical, mining, or smelting (CMS) industries do display greater levels of EMA use.
10.	Jalaludin et al. (2011)	74 accountants from Malaysian manufacturing companies	Postal questionnaire	▪ The level of EMA adoption was very low. ▪ The results of the questionnaire indicate that normative pressure in terms of training and accounting body membership was found to be the most forceful in influencing EMA adoption. ▪ However, the post-survey interviews revealed that none of the four accountants interviewed felt that they faced any normative pressure concerning environmental matters in their accounting practices. However, they did agree that their work was highly structured, dictated by their educational background and the training that they receive.
11.	Qian et al. (2011)	8 urban councils (2 metropolitan councils and 6 non-metropolitan councils) and four rural agricultural councils	Case study	▪ There is an increasing amount of EMA information being made available by the local governments. ▪ The EMA development of these local governments was influenced by social expectations and strategic positions for waste management.
12.	Christ and Burritt (2013)	108 accountants of Australian companies	Online survey	▪ On average the use of EMA (i.e. the present role of EMA) as perceived by the sampled accountants was found to be low level. ▪ However, the average score for the future role of EMA perceived by accountants in business was relatively higher, indicating EMA may become more prominent in organisations in the next three years ▪ The regression analysis revealed accountants' perceptions of present and future EMA use in their organisations were significantly associated with environmental strategy, the environmental sensitivity of the industry and organisational size. ▪ Overall, organisational context does play a significant role in determining whether organisations choose to adopt EMA practices.

2.2.4.3 Measurement of EMA Implementation

In measuring the EMA implementation among Australian companies, Frost and Wilmshurst (2000, pp. 350-351) considered five environmental accounting perspectives as follows:

Five environmental accounting perspectives:
i. The firm includes environmental information within the formal management accounting information system.
ii. The firm undertakes formal accounting procedures for a number of specific environmental issues
iii. The firm undertakes cost-benefit analysis to determine the viability of various actions which include the consideration of environmental issues
iv. The firm undertakes audits of the environmental issues impacting on the firm as a result of the firm's activities
v. The firm reports environmental information to external stakeholders

For each perspective, there were a number of items measured using a binary approach, by asking the respondents as to whether they have the item in place or not.

Frost and Seamer (2002) in their study examining the adoption of environmental management practices of New South Wales public sector entities, constructed two indices that measure EMS (10 items) and environmental accounting practices (9 items) as follows:

Environmental Management System Index	**Environmental Accounting Practices Index**
▪ Product costing and pricing ▪ Capital budgeting and expenditure ▪ Investment appraisal ▪ Performance measurement and appraisal ▪ Cost/benefit analysis ▪ Internal reporting mechanisms ▪ Product/process design ▪ Environmental audits ▪ Toxic release inventory (TRI) ▪ Purchasing policy	▪ Accounting for wastes ▪ Accounting for energy usage ▪ Accounting for recycling ▪ Accounting for returnable packaging/containers ▪ Accounting for pollution ▪ Accounting for land remediation ▪ Accounting for environmental contingent liabilities ▪ Accounting for costs of legal regulations ▪ Accounting for sustainability

Each item in the indices were measured using weighted score, with "two" if the practice is undertaken, "one" if there are plans to develop the practice, and "zero" if the practice is not currently undertaken and no plans to develop such a practice.

Adapting Frost and Seamer's (2002) indices, Ribeiro and Aibar-Guzman (2010) developed the following instruments to measure the extent of companies' environmental management practices and environmental accounting practices:

Environmental Management Practices Index (EMPI)	**Environmental Accounting Practices Index (EAPI)**
▪ existence of an environmental department ▪ elaboration of environmental indicators ▪ definition of the environmental policy ▪ disclosure of environmental indicators ▪ definition of plans of environmental actions to be undertaken ▪ elaboration of environmental information ▪ implementation of an environmental management system (EMS) ▪ disclosure of environmental information ▪ environmental diagnostic ▪ elaboration of an environmental report and/or a sustainability report ▪ development of documentation to support environmental management ▪ disclosure of an environmental report and/or a sustainability report ▪ training actions on environmental protection ▪ elaboration of environmental information to be disclosed through the media, brochures, internet, etc. ▪ development of environmental control mechanisms ▪ disclosure of environmental information of general scope through the media, the organisation's web-page, brochures, etc.	▪ elaboration of environmental budgets ▪ calculation of environmental costs ▪ elaboration of environmental accounting indicators ▪ allocation of budgetary funds to environmental projects or initiatives ▪ accounting recognition of environmental issues ▪ disclosure of environmental information in annual report ▪ involvement of the accounting department in the elaboration and publication of the environmental report or the sustainability report ▪ disclosure of environmental financial information in reports and publications other than the annual report (environmental report, sustainability report, the media, organisation's web-page, etc.

In contrast to Frost and Wilmshurst (2000) and Frost and Seamer (2002), Ribeiro and Aibar-Guzman (2010) conducted a content analysis of corporate annual reports to measure the adoption of both practices using the indices as parameters. Admittedly, the authors stated that the indices cannot be considered representative of all the environmental accounting procedures that can be developed by a company. Given the prevailing issue of incomprehensiveness of ER practices, the use of content analysis of annual reports may not be able to provide adequate information regarding a company's internal environmental accounting practices. In other words, the reporting does not necessarily cover all the company's accounting activities.

Apart from the above instruments, Burritt et al.'s (2002) EMA framework was utilised by Ferreira et al. (2010), Jalaludin et al. (2011) and Christ and Burritt (2013) in examining the EMA implementation. All these studies employed survey questionnaire for data collection and a likert-scale to measure the level of implementation.

Burritt et al.'s (2002) EMA Framework:

- Identification of environment-related costs.
- Estimation of environment-related contingent liabilities.
- Classification of environment-related costs.
- Allocation of environment-related costs to production processes.
- Allocation of environment-related costs to products.
- Introduction or improvement to environment-related cost management.
- Creation and use of environment-related cost accounts.
- Development and use of environment-related key performance indicators (KPIs).
- Product life cycle cost assessments
- Product inventory analyses.
- Product impact analyses.
- Product improvement analysis.

There are also case studies undertaken to measure a specific EMA practice, for instance, waste minimisation and environmental costs measurement; via its application in daily business activities (see Bartolomeo et al., 2000; Burritt and Saka, 2006; Gale, 2006;

Burritt et al., 2009; Qian et al., 2011). Through interviews and analysis of supporting documentations, the researchers described how the environmental issues were tailored in the companies' accounting systems.

The present study adapted Frost and Wilmshurst's (2000) environmental accounting perspectives in measuring the extent of EMA implementation of Malaysian PLCs and that a likert-scale is employed as opposed to binary "yes/no" approach. The development of the instrument will be discussed in greater details in Chapter 4.

2.3 The Association between EMA Implementation and ER Practices

The importance of accounting in addressing environmental issues has been highlighted by Gray (2010, p. 49),

> …if one was looking to solve the problems of the world one would be unlikely to choose accounting as one's starting point. However, if we are to consider narratives of sustainability at the organisational level, then it is accounts.

A similar remark has been made by Hopwood et al. (2010) where it has been argued that accounting facilitates the measurement of both quantitative and qualitative information including the environmental consequences of companies' strategies and actions on their financial performance. In particular, by making this information visible, the integration of such information into companies' decision makings can be sanctioned (Hopwood et al., 2010). Moreover, considering the impact of business activities on the environment cannot be isolated with companies' performance, the internalisation of externalities is necessary for companies to better manage their environmental performance (Gray et al., 2001; Lodhia, 2003; Gray, 2010). Consequently, as part of their stewardship function, companies are expected to report their quantified

externalities to the stakeholders to enhance their economic decision makings (Jones, 2010).

Based on the special role of accounting in sustainability, there is a strong emphasis on the potential of EMA implementation to change companies' ER practices (Tilt, 2006; Gray, 2010; Hopwood et al., 2010). It is generally accepted that the absence of EMA can hinder companies from generating relevant data for reporting purposes (Burritt et al., 2002; Schaltegger et al., 2003). Moreover, the fact that there is no generally accepted accounting standard on ER has taken its toll on the accountants' engagement in the generation of environmental information (Lodhia, 2003; Hopwood, 2009; Collins et al., 2011). In seeking to encourage a greater role for accounting and other environmental management organisation, a stricter reporting rule which necessitates the EMA implementation needs to be imposed (Gale, 2006).

However, it has been pointed out that the claimed nature of EMA information as an internal information and thus is confidential, is the ultimate reason for the hesitation of companies to report such information externally (Masanet-Llodra, 2006). It must be emphasised here that EMA supports both the internal decision making and external reporting (Frost and Wilmshurst, 2000; Burritt et al., 2002; Jasch, 2003; Schaltegger et al., 2003; Jasch, 2006) and apparently this often been overlooked. Masanet-Llodra (2006) found that most of the EMA information was predominantly used for internal decision making purposes. Similarly, Criado-Jimenez et al. (2008), through a content analysis of 78 corporate annual reports of large Spanish between 2001 and 2003, revealed that the compliance with the ICAC-2002 standard (an accounting standard that requires companies to disclose environmental information in the financial statement) did not resolve the issue of incompleteness of ER as non-compliance cases remain

pertinent. Notwithstanding the abovementioned findings, in a study of EMA implementation among Japanese companies, it was found that such implementation was driven largely by companies' intention to comply with mandatory ER requirement (Kokubu and Nashioka, 2008).

The association between EMA implementation and ER practices can be best explained from the perspective of social issue life cycle theory. According to the theory, the high commitment towards the environment will drive the integration of environmental information into business decision-making and performance evaluation, as well as the reporting of such information to the stakeholders (Nasi et al., 1997). This suggests that highly committed companies on environmentally responsible are manifested through a greater implementation of EMA and being transparent in reporting their environmental performance. Transparency here means the report is balanced, comparable, accurate, timely, comprehensive and reliable, as suggested by GRI (2011). In fact, GRI (2011) emphasises on the reporting of quantitative and qualitative information to secure all these characteristics, further suggesting the importance of accounting in addressing social and environmental problems.

Based on the above discussion, to promote sustainability, the greening of accounting is essential. On top of that, the willingness of companies to report relevant environmental information to the stakeholders will make a great value-added to the whole process. Although evidence on the impact of regulation on ER on the implementation of EMA and on the reporting itself is mixed, the law of supply and demand defines that there should be an interaction between demand and supply. In particular, as demand for environmental information is gradually increasing, the legitimation strategies will eventually threaten the existence of companies. That is, failing to report relevant

environmental information may prompt further scrutiny over the company's environmental activities. Moreover, given how irresponsible business activities affected the environment as well as the society at large, it is vital to alert companies to stop compromising the environment for the sake of profit maximization. Instead, companies need to be reminded that it actually pays to be green (Burnett and Hansen, 2008; Burritt et al., 2009). In addition, the notion that EMA information should be internally circulated needs to be addressed. In fact, the significance of EMA to support external reporting has been realised by many if not all practitioners as a growing number of companies began to report the EMA-type physical information, although the disclosure is very limited (Jasch and Savage, 2009).

2.4 Conclusion

This chapter reviewed prior literature in the areas of interest, that is, EMA and ER. The extant argumentations and findings were carefully evaluated and discussed to construct the underlying philosophical views about the present study. Overall, several key issues can be summarised in this respect.

First, although ER and EMA research are both emerging, EMA received relatively lesser attention (Ferreira et al., 2010). Empirical evidence indicates that the EMA implementation among companies is generally low (Bartolomeo et al., 2000; Frost and Wilmshurst, 2000; Frost and Seamer, 2002; Burritt and Saka, 2006; Masanet-Llodra, 2006; Criado-Jimenez et al., 2008; Ferreira et al., 2010; Ribeiro and Aibar-Guzman, 2010; Christ and Burritt, 2013). Companies with certain corporate characteristics, such as, large-sized, environmentally sensitive industries, proactive environmental strategy and green product innovation are viewed as more likely to implement a greater extent of EMA, consistent with contingency theory. Within these limited number of EMA studies,

the overall empirical evidence suggests that there is an association between these characteristics and EMA implementation, although the evidence may seem mixed (see Frost and Wilmshurst, 2000; Frost and Seamer, 2002; Masanet-Llodra, 2006; Criado-Jimenez et al., 2008; Ferreira et al., 2010; Ribeiro and Aibar-Guzman, 2010; Christ and Burritt, 2013). The mixed evidence perhaps suggests more empirical work to be carried out to enrich the discussion.

Second, many prior studies on ER implicitly suggest that companies should report their environmental activities (see Tilt, 2006). However, very little research has been undertaken to empirically explore the association between EMA implementation and ER practices (Frost and Seamer, 2002; Tilt, 2006; Ferreira et al., 2010; Christ and Burritt, 2013). The examination of such association is relevant especially when concerns over credibility and incomprehensiveness of ER are continually being debated. In particular, the implementation of EMA is crucial for companies to enhance their ER practices given conventional accounting practices do not support the measurement of environmental information (Burritt et al., 2002; Schaltegger et al., 2003; Burritt, 2004). However, the absence of regulatory pressure on ER creates another problem. That is, the discretion over the dissemination of environmental information has led to the legitimation strategies, hampering the disclosure of quantified environmental information or environmental performance in general.

In Malaysia, as part of the government's initiatives to embed the culture of socially and environmentally responsible among PLCs, CSRR has been made mandatory with effect from 2007. At its most basic level, this effort can be seen as a good start for better reporting practices of companies' environmental footprints. Such a view is supported by the results of ACCA (2010a) that reported the number of companies providing

environmental information in the annual reports is increasing after the CSRR mandate. However, the quantity and quality of environmental information reported decreased gradually in the subsequent years after the mandate (2008 – 2009) (Zainal et al., 2013), although it was relatively higher than previously reported a year before the mandate (Alrazi et al., 2009; Zainal et al., 2013). It is worthy to note that the mandate is fall short of specific reporting requirements (Alrazi et al., 2009; Zainal et al., 2013). In addition, ER practices among Malaysian companies in general is still at infancy (Ahmad et al., 2003; ACCA, 2003b; Nik Ahmad and Sulaiman, 2004; Yusoff et al., 2007; Alrazi et al., 2009; ACCA, 2010a; ACCA, 2010b; Buniamin, 2010).

Third, ER can be seen as a pragmatic compromise between the needs for environmental conservation and the importance of economic development. Such a concern has been enunciated by Hopwood (2009) where it is not clear whether companies disclosing environmental information to reflect their environmental performance or simply oriented towards legitimacy. Prior findings suggest that companies tend to report more declarative or positive environmental information information (Hackston and Milne, 1996; Ahmad et al., 2003; Ferreira, 2004; Nik Ahmad and Sulaiman, 2004; Jaffar, 2006; Yusoff et al., 2007; Alrazi et al., 2009; Buniamin, 2010). In addition, despite the fact that EMA implementation enables the enhancement of companies' internal decision making process and external reporting, such an implementation does not necessarily influence the decision of companies to report quantified environmental information (Masanet-Llodra, 2006; Criado-Jimenez et al., 2008). Nonetheless, the implementation of environmental management practices or accounting systems has led to a greater extent of ER (Frost and Seamer, 2002; Kokubu and Nashioka, 2008; Ribeiro and Aibar-Guzman, 2010). These findings suggest that seeking for legitimacy remains pertinent.

Looking at the above issue from the perspective of social issue life cycle theory, a high commitment of a company towards its business environmental impact would be reflected in the integration of environmental information into the daily decision-making processes, and such integration will subsequently lead to companies reporting their environmental performance (Nasi et al., 1997). Accounting is seen as the only way to create corporate responsibility towards business environmental impacts (Gray, 2010; Hopwood et al., 2010). In this sense, it is reasonable to assume that the higher the commitment towards the environment, the higher the extent of EMA implementation, and the higher the quantity and quality of environmental information to be reported. Thus, using a social issue life cycle theory as theoretical underpinnings, the empirical research examining the association between EMA implementation and ER practices provides another dimension to look at in attaining a better understanding of companies' environmental practices.

The next chapter offers a discussion on the theoretical framework and hypotheses development.

CHAPTER THREE

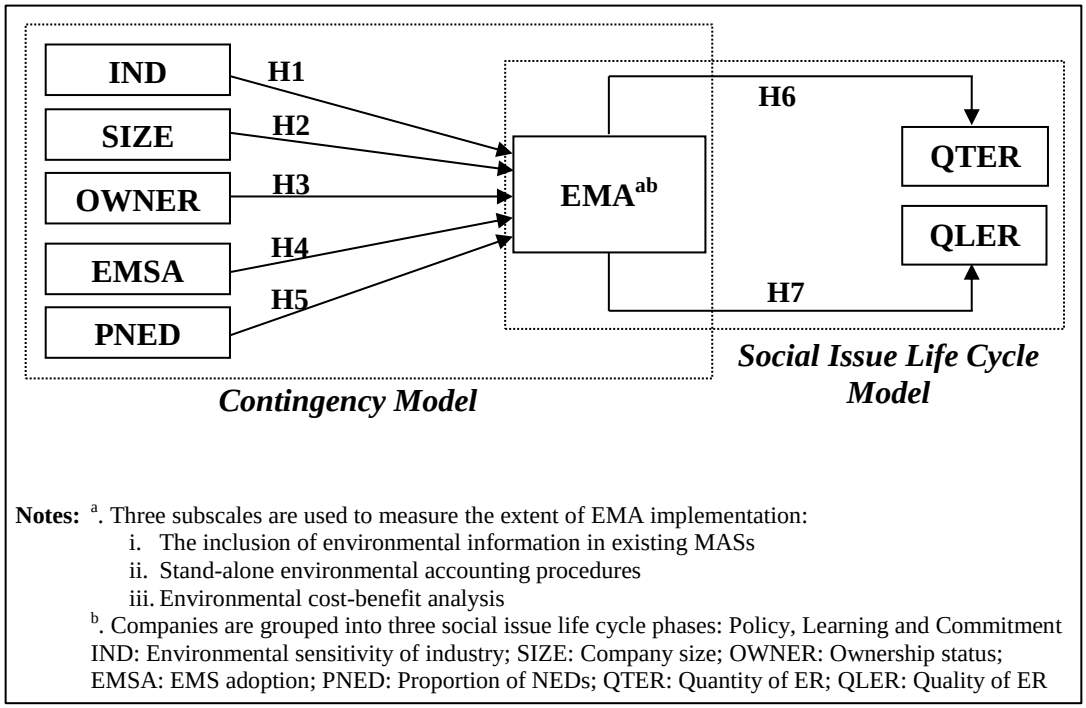
THEORETICAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

3.0 Introduction

The preceding chapter reviewed relevant literature in the areas of ER and EMA. Drawing upon the reviewed literature, the current chapter sets out the theoretical framework and hypotheses development of the study. Following the introduction, a discussion on the theoretical framework is first presented. Next, with reference to the theoretical framework, seven hypotheses are developed and the development of each hypothesis will be discussed in turn. The chapter finally concludes with a summary of key points ascended in the discussion.

3.1 Theoretical Framework

Figure 3.1 depicts the theoretical framework of the present study. As previously mentioned, the main objectives of the present study are threefold; first, to examine the extent to which Malaysian PLCs implement EMA, second, to examine whether the EMA implementation is influenced by corporate characteristics (also known as contingent variables), and third, to determine whether there is association between EMA implementation and ER practices, in the context of Malaysian PLCs. To meet these objectives, contingency theory and social issue life cycle theory provides the theoretical underpinnings. Accordingly, two models – contingency and social issue life cycle models; are constructed and each will be analysed separately.



Notes: [a]. Three subscales are used to measure the extent of EMA implementation:
i. The inclusion of environmental information in existing MASs
ii. Stand-alone environmental accounting procedures
iii. Environmental cost-benefit analysis
[b]. Companies are grouped into three social issue life cycle phases: Policy, Learning and Commitment
IND: Environmental sensitivity of industry; SIZE: Company size; OWNER: Ownership status;
EMSA: EMS adoption; PNED: Proportion of NEDs; QTER: Quantity of ER; QLER: Quality of ER

Figure 3.1: Theoretical Framework

3.1.1 Contingency Model

Based on the fundamental premise of contingency theory, the implementation of MASs will be contingent upon a company's external and internal surroundings to include size, technology, market environment, organisational structure, government regulations and corporate strategy (Otley, 1999; Chenhall, 2003; Abdel-Kader and Luther, 2008). More precisely, 'one size does not fit all'. In today's globalised world, responding quickly to changing market demands appears to be the central key for a company to gain advantage against its competitors. For example, there has been a gradual movement away from traditional MASs (e.g. standard costing, budgetary control) toward an increased use of new or advanced MASs such as balanced scorecard (BSC), total quality management (TQM) and just-in-time (JIT) (Chenhall, 2003; Abdel-Kader and Luther, 2008; Tuanmat and Smith, 2011).

This also applies to EMA implementation. Over the past decades, concerns over business environmental impacts have been gradually increasing, entailing the need for companies to promptly and effectively respond to these concerns. Conventional accounting practices, however, do not support the quantification of non-financial or environmental information (Burritt et al., 2002; Schaltegger et al., 2003; Burritt, 2004). In such a situation, companies need to implement EMA so as to support their decision making processes as well as to report relevant environmental information to the stakeholders.

In examining the extent of EMA implementation among Malaysian PLCs, the selection approach of contingent fit is to be considered. Selection approach examines the association between contingent variables with aspects of MASs without attempting to assess their link with companies' performance (Chenhall, 2003). Although omitting performance in the contingent theory model is overly simplistic (Otley, 1980), given EMA research is still in its early stage in Malaysia as well as globally, the paucity of sufficiently strong supportive evidence justifies a concise and uncomplicated manner in examining the issue (Christ and Burritt, 2013).

In light of the above discussion, the first model predicts that the extent of EMA implementation is to be explained by corporate characteristics, namely, environmental sensitivity of industry, company size, ownership status, EMS adoption and the proportion of NEDs.

3.1.2 Social Issue Life Cycle Model

The second model – social issue life cycle model, examines the association between EMA implementation and ER practices. Although the theory has been predominantly

conversed in view of ER and longitudinal research, the present study, however, believes that its application should not be limited to such parameters. Rather, the application of the theory in cross-sectional and EMA research can potentially provide valuable insights. Most importantly, the rationale for choosing the theory to investigate the association between EMA implementation and ER practices is due to the assumption that the enthusiasm of companies towards environmental activities are subjected to the significance of such activities on their business existence (Nasi et al., 1997).

In brief, social issue life cycle theory suggests that an issue evolves from being insignificant to a state where a solution for the issue is established (Zyglidopoulos, 2003). Accordingly, a company's reaction is to be determined by this transition of an issue, which can be categorised into three phases, namely, Policy, Learning and Commitment (Nasi et al., 1997). As maybe recalled (see Table 2.1 – Chapter 2), the Policy phase is where environmental issues are not the priority concern, the Learning phase is where concern on environmental issues begins to accelerate, and the Commitment phase is where environmental issues become the primary concern and are included into companies' business decision makings. This often is followed by the reporting of companies' environmental performance to the stakeholders (Nasi et al., 1997). Such a view is not dissimilar to Gray et al.'s (1995b) organisational change model[25]. According to the model, environmental agenda may trigger organisational change, which can be categorised into three types of business response: inertia (static – doing nothing), morphostatic (follow law and public opinion) and morphogenetic (aim for sustainable business) (Gray et al., 1995b, p. 219). Extending Gray et al.'s model, Tilt (2006) incorporates environmental activities as the resultant output of organisational change, where it is expected that the more committed the company towards the

[25] Drawing on Laughlin's (1995) typology of organisational change, Gray et al. (1995b) revisited the model by incorporating the environment as one of the factors of organisational change.

environment, the greater quantity and quality of environmental information is to be reported (Tilt, 2006). From the perspective of social issue life cycle theory, inertia can be considered as policy phase, morphostatic as learning phase, and morphogenetic as commitment phase. Thus, it is reasonable to assume that the higher the commitment to the environment, the higher is the extent of EMA implementation, and that ER practices would be associated with the extent to which companies implement EMA. More specifically, the second model predicts that the quantity and quality of ER are to be explained by the extent of EMA implementation.

3.2 Hypotheses Development

With reference to the theoretical framework outlined above, this section discusses the development of hypotheses in greater details. To examine the association between corporate characteristics and the extent of EMA implementation, the hypotheses are developed using contingent theoretic arguments. Whilst, social issue life cycle perspective is used to explain the association between EMA implementation and ER practices.

3.2.1 Environmental Sensitivity of Industry and the Extent of EMA Implementation

Environmental sensitivity of industry can be classified into sensitive and less sensitive. Environmentally sensitive industries are those business activities that are capable of easily affecting the environment, directly or indirectly. On the other hand, environmentally less sensitive industries are those business activities that have less impact on the environment, directly or indirectly. Prior studies consider chemical, constructions, plantations, transportation, mining and resources, petroleum (oil/gas), property and industrial products sectors as environmentally sensitive industries (e.g.

Deegan and Gordon, 1996; Frost and Wilmshurst, 2000; Ahmad et al., 2003; Nik Ahmad and Sulaiman, 2004; Jaffar, 2006; Alrazi et al., 2009; Buniamin, 2010).

Past management accounting studies have placed a considerable emphasis on the effect of industry on the design of companies' MASs. Issues related to a particular industry, for example, customers orientation, public expectations and regulations, have been linked to the implementation of advanced MASs (Hoque, 2004; Abdel-Kader and Luther, 2008). The past decades have seen an increase in the stakeholders' awareness of environmental issues (Deegan and Rankin, 1997; Murray et al., 2006; De Villiers and Van Staden, 2010). In such a situation, loss of reputation as a consequence of poor environmental performance may adversely impact companies' future financial condition and in extreme cases, may threaten their existence. Poor environmental performance is also associated with increased regulatory cost, in most cases. Thus, in their effort to educate and inform the stakeholders about their environmental performance, companies are expected to implement EMA which would allow the generation of a more accurate and relevant environmental information (Frost and Seamer, 2002). It has also been pointed out that different levels of public scrutiny on companies' environmental performance can potentially influence companies' decisions concerning EMA implementation (Frost and Wilmshurst, 2000). In particular, it is "reasonable to assume a firm within the retail industry will have different environmental management procedures and policies than a similar sized firm in the extractive or chemical industry" (Frost and Wilmshurst, 2000, p. 348). Likewise, Ferreira et al. (2010) argue that the EMA implementation of companies in environmentally sensitivity industries should be beyond mere innovation, considering the greater impacts the industries have on the environment.

The effect of industry on EMA implementation is rather mixed. For example, Ferreira et al. (2010) and Christ and Burritt (2013) found that environmentally sensitive industries are to be associated with higher EMA implementation, while, Frost and Wilmshurst (2000) did not. One explanation for these differing findings is perhaps the time period. Environmental issues are becoming more widespread over time and that there is growing interest on the part of companies in implementing EMA to manage their business environmental impacts (Burritt and Saka, 2006; Burnett and Hansen, 2008; Jasch, 2009). With regard to environmental management practices, Frost and Seamer (2002) found a positive relationship between EMS adoption and environmentally sensitive industries.

In Malaysia, from 2007 onwards, the revamped listing requirement of Bursa Malaysia (Appendix 9C, Part A, Paragraph 29) requires all PLCs to report their CSR information in the annual report. Because conventional accounting practices do not capture environmental information (Burritt et al., 2002; Schaltegger et al., 2003; Burritt, 2004), the EMA implementation is therefore essential. Although it is lacking in terms of specific reporting requirements, the mandate may exert pressure on companies, especially those in environmentally sensitive industries, to conform to the rule that have been set out on them. This is because these industries have greater adverse impacts on the environment and come under greater public scrutiny. Therefore, the first hypothesis is formulated as follows,

H1: Companies in environmentally sensitive industries are more likely to implement a higher extent of EMA than those in environmentally less sensitive industries.

3.2.2 Company Size and the Extent of EMA Implementation

It is claimed that the generation of environmental information involves large sums (Ahmad et al., 2003; Dahlmann et al., 2008). Without doubt, installing a new system requires a company to invest a considerably large amount of money, for example, to train employees or hire specialist/expertise to run the new system and to purchase a new machine or upgrade existing machine/accounting system. In the case of embarking on green initiatives, there is a need for production reformation through continuous R&D or green acquisition – buying green equipment, of which all requires high costs and commitment on the part on the management as well as employees. Thus, the ability to generate more resources, be it capital or human resources, provides a greater opportunity for large companies to adopt sophisticated MASs integrating financial and non-financial measures (Ezzamel, 1990; Chenhall, 2003; Hoque, 2004; Abdel-Kader and Luther, 2008; Cadez and Guilding, 2012), including EMA implementation as an MAS that integrates both physical and monetary environmental information.

Furthermore, it has been suggested that the span of business activities may influence the environmental uptakes of companies. More specifically, the larger the company, the more activities they carry out, and the greater the risk of affecting the environment (Hackston and Milne, 1996). Considering EMA assists companies to govern their environmental performance, large companies with a large scope of business activities are more likely to implement EMA in an attempt to minimise public scrutiny on their business activities.

Empirical evidence on the association between company size and EMA implementation seems to be mixed. The findings of Frost and Seamer (2002), Ribeiro and Aibar-Guzman (2010) and Christ and Burritt (2013) suggests that large companies are more

likely to implement a greater extent of EMA. Ferreira et al. (2010), on the contrary, found no association between company size and EMA use.

Based on the above discussion and that the effect of company size on EMA implementation is still less explored (Christ and Burritt, 2013), the present study assumes that the extent of EMA implementation will vary depending on company size. The uncertainty of environmental liabilities from which large companies are bearing due to the load of their activities and the fact that they have sufficient resources to carry out a more sophisticated MAS, the implementation of EMA is more likely to be positively skewed. Therefore, the second hypothesis is formulated as follows,

H2: Company size is associated with a high extent of EMA implementation.

3.2.3 Ownership Status and the Extent of EMA Implementation

Public companies are claimed to be more responsive towards external pressures such as public expectation and government regulations because they rely primarily on public support to market their shares (Freedman and Stagliano, 2002). As regards companies' environmental activities, there has been an extensive research focusing on understanding how public companies response to public concerns through ER practices (e.g. Frost and Wilmshurst, 2000; Wilmshurst and Frost, 2000; Ahmad et al., 2003; Campbell et al., 2003; Nik Ahmad and Sulaiman, 2004; Alrazi et al., 2009; Buniamin, 2010; Bouten et al., 2011).

Within the context of public companies, there is a growing body of research examining the social and environmental reporting practices of companies owned by the government or also referred to as government-linked companies (GLCs). GLCs are

defined as companies in which the government provides the funds to undertake commercial activities on behalf of the government. In the Malaysian context, the government has a direct controlling stake to appoint the board of directors, senior management and make substantial decisions (e.g. restructurings, divestments and acquisitions) for GLCs (PCG, 2006). GLCs account for 34% of market capitalisation of Bursa Malaysia and they are the main providers of the core strategic utilities and services. Prior studies suggest that the 'political visibility' of GLCs may have a significant effect on companies' environmental undertakings, particularly on the external reporting practices (Cormier and Gordon, 2001; Amran and Susela, 2008; Said et al., 2009; Wan Abdul Rahman et al., 2011). More specifically, the affiliation with the government induces increased public scrutiny over the accountability aspect where GLCs are expected to act in accordance with the government vision which emphasises the wellbeing of the citizens (Cormier and Gordon, 2001; Amran and Susela, 2008).

In Malaysia, over the years, there have been a lot of environmental initiatives initiated by the government besides the environmental regulations. Inter alia, companies are ruled to receive a recycling tax rebate for the machinery involved in the process of recycling. Tax incentives are also offered for various environmental protection activities, for example, the use of environmental protection equipment, energy conservation and utilisation of biomass. Apart from these efforts, GLCs also have a special policy with regard to CSR activities which is documented into the Silver Book. The Book promotes responsible business activities, outlining how GLCs should contribute to the society as well as the environment. In 2012, the Silver Book BPN was published to provide practical guidance and case studies for developing and implementing robust CSR programmes (PCG, 2013).

While extant evidence shows that political visibility has contributed to a greater extent of social and environmental reporting of GLCs in comparison to non-GLCs (Cormier and Gordon, 2001; Amran and Susela, 2008; Said et al., 2009; Wan Abdul Rahman et al., 2011), such an effect is rather weak on determining companies' environmental management practices. For instance, Frost and Seamer (2002) found no association between the level of environmental management practices and political visibility. Using the Portuguese local entities as the sample, Ribeiro and Aibar-Guzman (2010) found that the extent of development of environmental accounting practices among the entities was low, suggesting that the political visibility has no effect on the EMA implementation. In a more recent study, Ribeiro et al. (2012) found no significant different in the extent of development of environmental management practices between city councils and municipal companies. Both city councils and municipal companies are public companies, but the latter is subjected to the regulatory accounting framework applicable to private businesses (Ribeiro et al., 2012).

After almost a decade since the Malaysian government first introduced the Silver Book, a widespread social and environmental contribution of GLCs can be expected. This is supported by the finding s of Esa and Mohd Ghazali (2012) that suggest there has been a positive change in the level of GLCs' CSRR following the Silver Book introduction. Furthermore, considering GLCs are vulnerable with regard to the execution of 'accountability' and 'visibility' aspect (Cormier and Gordon, 2001; Amran and Susela, 2008; Said et al., 2009; Wan Abdul Rahman et al., 2011) and that CSRR is now mandatory, it is reasonable to assume that GLCs are more likely to implement a higher extent of EMA to support their environmental-related decisions than those of non-GLCs. This leads to the third hypothesis,

H3: GLCs are more likely to implement a higher extent of EMA than non-GLCs.

3.2.4 EMS Adoption and the Extent of EMA Implementation

Generally, EMS and EMA constitutes two different aspects. An EMS provides guidelines for achieving effective environmental management practices (ISO, 2009). It seeks to evaluate companies' environmental goals, policies and legal compliances (Steger, 2000; Comoglio and Botta, 2012) for the purpose of minimising or controlling wastes and pollutions (Melnyk et al., 2003). On the other hand, EMA is an internal accounting system used to quantify environmental information, seeking ultimately to measure environmental performance.

The trend of EMS adoption to facilitate the management of companies' environmental activities is encouraging. According to the *Environmental Standard* issued by the ISO, the number of companies adopting ISO14001 – an accreditation for sound EMS, is rapidly increasing (International Organisation for Standardisation [ISO], 2009). In Malaysia, ACCA (2002) reported that one third of Malaysian companies that embarked in ER have an EMS in place. This figure is expected to rise over the years as concerns on companies' environmental activities are fast growing, as manifested by the CSR mandate and green initiatives proposed by the government.

While it is not necessary for companies to obtain an accreditation for their EMS, getting the system accredited, for example, through ISO standard – ISO 14001, facilitates companies in developing a sound EMS (Melnyk et al., 2003). Furthermore, it has been suggested that the voluntary implementation attached to such accreditation is associated with companies' environmental strategy (Epstein and Roy, 2003). As such, companies

implement an EMS and have it accredited in order to meet their green efforts or goals. There is also a view that EMS implementation and its accreditation is no more than corporate survival strategy. More specifically, companies are more likely use such an implementation and accreditation to appear legitimate. Nonetheless, being accredited with ISO140001 provides assurance to the stakeholders that the environmental impact of the company is being measured and improved (ISO, 2009).

There is evidence that suggest EMS adoption provides assistance to companies to achieve better environmental performance (Arimura et al., 2008; Russo, 2009; Nishitani et al., 2012) and environmental management (Noren and Von Malmborg, 2004). This can be expected as EMS adoption allows companies to experience a greater selection and use of environmental options (e.g. recycling, returnable packaging and product redesign) (Melnyk et al., 2003). In the perspective of Malaysian manufacturing companies, the ISO 14001 accreditation was found to have a positive association with environmental and economic performance (Tan, 2005; Goh et al., 2006; Goh and Abdul Wahid, 2010).

Frost and Seamer (2002) contend that the development of an EMS does not correlate with the development of EMA as there is a lack of consideration on accounting aspect. In contrast to Frost and Seamer (2002), Jasch (2009) suggests that through EMA, accountants are able to adequately capture the link between financial and environmental performance for controlling and benchmarking purposes, which are the essence of the EMS. This argument is supported by the findings of Ribeiro and Aibar-Guzman (2010) that suggest that the development of environmental management practices, which

includes EMS [26] implementation, influences the development of environmental accounting practices. As such, to execute an EMS effectively, the quantification of environmental information is essential. Based on the above discussion, it is reasonable to assume that EMA is more likely to be implemented when companies have an EMS in place. Therefore, the fourth hypothesis is stipulated as follows,

H4: Companies that have adopted an EMS are more likely to implement a higher extent of EMA than those that have not.

3.2.5 The Proportion of NEDs and the Extent of EMA Implementation

The composition of the board of directors, which constitutes insiders (management) and outsiders (non-executive), is crucial in determining the success of the monitoring process (Fama, 1980; Fama and Jensen, 1983; as quoted by Lanis and Richardson, 2011). In the Malaysian Code on Corporate Governance[27] (2000), NEDs are defined as "persons of calibre, credibility and have the necessary skill and experience to bring an independent judgement to bear on the issues of strategy, performance and resources including key appointments and standards of conduct".

For the board to be effective, at least two of the directors or one-third of the board members (whichever is higher) must be independent (Listing Requirement of Bursa Malaysia, Chapter 15, Part B, Paragraph 15.02(1)). An independent director is "a director who is independent of management and free from any business or other relationship which could interfere with the exercise of independent judgement or the ability to act in the best interests of an applicant or a listed issuer" (Listing Requirement of Bursa Malaysia, Chapter 1). In the reinforcement of board independence (under

[26] There is no justification as to whether it is accredited or not, thus, it is deemed that EMS here refers to its general definition of which relates to a system that assists companies to meet legal requirements and environmental goals (Steger, 2000; Welch et al., 2002; Bansal and Hunter, 2003).
[27] Malaysian Code on Corporate Governance is embedded in the listing requirements of Bursa Malaysia.

Principle 3) in the revised Malaysian Code on Corporate Governance 2012, inter alia, when the Chairman of the board is not an independent director, the board must comprise a majority of independent directors, further demonstrating the importance of balance in power to safeguard the rights and interests of the stakeholders.

Considering the main function of NEDs is to enhance a company's corporate image (Said et al., 2009), the inclusion of NEDs who represent the interest of stakeholders may help improve the responsiveness of a company to social and environmental issues (Haniffa and Cooke, 2005; Brammer and Pavelin, 2006, 2008). A commitment towards the environment can be seen as one of the corporate image indicators where in the case of negative public perception over a company's environmental performance, its image can be threaten. Despite the claim made by Haniffa and Cooke (2005), Brammer and Pavelin (2006, 2008) and Said et al. (2009), their findings suggest that the role of NEDs in companies' ER practices was rather limited. Such a situation may be attributed to the relative lack of experience and knowledge of NEDs (Haniffa and Cooke, 2005). However, in the world today where demand for environmental information is becoming widespread (Deegan and Rankin, 1997; Murray et al., 2006; De Villiers and Van Staden, 2010) and that various developments in the global business perspective concerning the environment come into view, the extent to which NEDs responds to these issues will determine the successful of the corporate governance. More specifically, an effective check-and-balance ensures that while maximising the shareholders' value, the right of the stakeholders are equally preserved.

Given the points highlighted in the previous paragraph, it is reasonable to assume that the more NEDs sit on the board, the greater the company's responsiveness towards environmental issues and the greater is the extent of EMA implementation to support the decision making processes. This leads to the fifth hypothesis,

H5: The proportion of NEDs is associated with a high extent of EMA implementation.

3.2.6 The Extent of EMA Implementation and ER Practices

It has been emphasised that the role of accounting should evolve to become a salient part of environmental and/or sustainability development (Gray, 2010; Hopwood et al., 2010; Deegan, 2013). The basic premise is that by making environmental information visible, physically and monetarily, companies are able to integrate such information into their business decisions and external reporting to meet the stakeholders' needs (Burritt et al., 2002; Schaltegger et al., 2003; Burritt and Saka, 2006; Hopwood et al., 2010). Furthermore, business environmental impacts cannot be isolated with companies' performance in such a way that the internalisation of externalities is necessary to hold companies responsible for their adverse environmental performance (Gray et al., 2001; Lodhia, 2003; Gray, 2010). This is because, companies are more likely to consider their business environmental impacts once they are presented in dollars and cents (Sulaiman and Nik Ahmad, 2006).

Transparency in ER is necessary to keep the stakeholders adequately informed on the companies' environmental performance. Here, the information reported should be balanced, comparable, accurate, timeless, clear and reliable (GRI, 2011). Such a view takes into consideration the importance of companies discharging their environmental accountability through external reporting, regardless the medium of reporting. However, this important element is relatively absent in the current ER practices of companies. Until today, issues pertain to the incompleteness, lack of credibility and incomparability of ER remains significant (Adams, 2004; Owen, 2008; Othman and Ameer, 2010; Gillet,

2012). Much empirical evidence shows that companies tend to disclose narrative and positive environmental information (see Hackston and Milne, 1996; Ahmad et al., 2003; Ferreira, 2004; Nik Ahmad and Sulaiman, 2004; Jaffar, 2006; Yusoff et al., 2007; Alrazi et al., 2009; Buniamin, 2010; Bouten et al., 2011). Moreover, reports vary between companies (Othman and Ameer, 2010).

Drawing upon Gray's (1995b) organisational change model, Tilt (2006) contends that a transformation in corporate strategies and culture is crucial to change companies' ER practices to be more substance than form. Given the special role of accounting in delivering relevant information for business decision making, a strong emphasis on the potential of EMA implementation to change the ER practices of companies has been placed in this respect (Tilt, 2006; Gray, 2010; Hopwood et al., 2010).

Likewise, from the perspective of social issue life cycle theory, the generation of ER as a supplementary reporting is seen to be derived from the integration of environmental information into a company's business decision makings (Nasi et al., 1997), depicting an association between EMA implementation and ER practices. Before getting into the discussion, social issue life cycle theory, in brief, posits that companies' reactions to environmental issues can be segmented into three phases, namely, Policy, Learning and Commitment; and that such reactions are not random, instead, they follow a sequence (Nasi et al., 1997; Zyglidopoulos, 2003). In the Policy phase, addressing environmental issues is not the main concern as meeting public expectation is insignificant (Nasi et al., 1997). With regard to ER practices, it is reasonable to assume that companies in this phase to report only general environmental statement and that EMA implementation is likely to be less feasible as there is no immediate need for companies to act within the boundary of public expectation.

In the Learning phase, where companies' environmental awareness begins to accelerate, an environmental specialist or professional is usually hired and given the responsibility to implement the environmental policy or goals (Nasi et al., 1997). However, environmental issues are yet to be included in the business decision makings entirely. Notwithstanding this, partial EMA implementation may possibly be in place considering they are in the phase where they come into being concern to environmental issues relevant to their business.

In the Commitment phase, the solution to environmental issues is manifested by the integration of environmental information into companies' business decisions (Nasi et al., 1997). The issues are now becoming the responsibilities of the line managers. It is in this phase where the EMA implementation supports the ER practices. In this regard, while many previous ER studies made an implicit suggestion that companies that are involved in environmental management practices should report such information, none of these studies actually tested the association (see Tilt, 2006). That having been said, it however has been evidenced in a study of Frost and Seamer (2002) that the development of environmental management practices is associated with the extent of ER. However, there are also studies that found EMA implementation to have a little value to ER practices. For example, Masanet-Llodra (2006) found that EMA information was largely used for internal decision making purposes. In addition, Criado-Jimenez et al. (2008) also reported that the regulation of environmental accounting standard did not influence the disclosure of environmental accounting information. The refusal to report environmental information was largely attributed to legitimation of business activities (Masanet-Llodra, 2006; Criado-Jimenez et al., 2008).

Inevitably, EMA implementation enables companies to generate both physical and monetary environmental information (Burritt et al., 2002; Jasch, 2003; Schaltegger et al., 2003; IFAC, 2005). In fact, the emergence of EMA is parallel to the need of companies to report their environmental information (Burritt et al., 2002) to improve the stakeholders' economic decision-making (Burnett and Hansen, 2008; Raiborn et al., 2011). Notwithstanding the findings of Masanet-Llodra (2006) and Criado-Jimenez et al. (2008), taking into consideration the benefits of EMA and the perspectives of social issue life cycle theory, the present study assumes that the ER practices, in terms of the quantity and quality, would be different for each social issue life cycle phase. More precisely, companies in the Commitment phase are more likely to report more and relevant environmental information than those in the Policy and Learning phases. On the other hand, it is expected that the absence of EMA or less formal EMA implementation in companies in the Policy and Learning phases, would least stimulate the quantity and quality of ER by the companies in these phases. Therefore, the following hypotheses are formulated,

H6: Companies in the Commitment phase are more likely to report a greater quantity of ER than those in the Policy and Learning phases.

H7: Companies in the Commitment phase are more likely to report a greater quality of ER than those in the Policy and Learning phases.

3.3 Conclusion

Based on a review of relevant literature as well as theoretical assumptions, seven hypotheses have been developed in an attempt to meet the research objectives of the present study. Overall, using two models – contingency and social issue life cycle

models, two main substances are examined. First, the present study seeks to examine the extent to which companies implement EMA and whether such implementation is influenced by five corporate characteristics. These are environmental sensitivity of industry, company size, ownership status, EMS adoption and the proportion of NEDs. Second, the present study aims to examine whether there is an association between the extent of EMA implementation and ER practices.

In the next chapter – Chapter Four, the research method employed in the present study will be discussed. In particular, exploiting the philosophical position, the research method is constructed to aid the measurement of variables as well as the hypotheses testing.

CHAPTER FOUR

RESEARCH METHODS

4.0 Introduction

The theoretical framework and hypotheses development were discussed in the preceding chapter. The current chapter aims to discuss the research methods employed in the present study, which include postal questionnaires and content analysis of corporate annual reports. Each of these methods will be discussed in turn.

The chapter begins with a discussion on the epistemological and ontological assumptions adopted by the researcher. In the second section, the sample selection is discussed followed by a discussion on data collection in the third section, and data analysis in the fourth section. The final section concludes the chapter.

4.1 Epistemological and Ontological Assumptions

An epistemology assumption plays an important role in determining what to research, how to analyse the data and in what ways to conclude the findings. Perhaps in the accounting domain, Chua's (1986) *Radical Developments in Accounting Thought* has become a classic in the elucidation of diverse philosophical assumptions held by researchers. Chua (1986) classified accounting research into two main approaches: mainstream accounting and alternative worldviews. Mainstream accounting emphasises on the positivistic stance or scientific approach in which statistical evidence are used to deduce conclusions (Johnson and Duberley, 2000). The use of large-scale and representative sample to draw conclusions against a theory is typically associated with this approach (Bryman and Bell, 2007). Because of this, the approach tends to

generalise the findings (Johnson and Duberley, 2000; Bryman and Bell, 2007). Quantitative research methods, for example, survey questionnaires, content analyses and experiments are most commonly associated with this approach.

On the contrary, the alternative worldview encompasses the interpretive and critical accounting, emphasises on the qualitative approach to research. It places a high priority on the researcher's subjectivity in describing the observed phenomena and theory building (Chua, 1986; Johnson and Duberley, 2000). In other words, it concerns on understanding a particular phenomenon in-depth based on the perspective of the research participants (McRoy, 1995). Generalisation of findings is not the ultimate aim of this approach. Unlike the quantitative approach where the researchers remain objectively isolated from the subject matter, in qualitative approach, the researchers are immersed in the research to enable them to induce conclusions (Johnson and Duberley, 2000; Bryman and Bell, 2007). Under this approach, the employment of ethnography, case studies and participation observation which allow the participation of researchers as part of the research is common (Johnson and Duberley, 2000).

The present study upholds the positivistic stance in an attempt to provide an answer to the research questions. Such a stance enables the researcher to postulate the underlying assumptions to determine the substance of the study as the present study emphasises the quantification of the problem, instead of defining the problem. More specifically, defining the problem often involves an interpretive or critical analysis to crack the gist of the problem, whilst the quantification of problem is an attempt to prove or disapprove a hypothesis/assumption. To quantify the problem, the review of prior literature on EMA and ER determines the basis to which the research questions are constructed.

Accordingly, adopting positivist approach necessitates that all the research questions to be tested deductively. Thus, the development of hypotheses was grounded by theoretical assumptions and that was subjected to statistical analyses. For the purpose of collecting data, postal questionnaires and content analysis of corporate annual report were employed. Content analysis of corporate reports is widely used in ER research while postal questionnaires are commonly used in EMA research (e.g. Frost and Wilmshurst, 2000; Frost and Seamer, 2002; Campbell et al., 2003; Alrazi et al., 2009; Beck et al., 2010; Ferreira et al., 2010; Othman and Ameer, 2010; Bouten et al., 2011; Christ and Burritt, 2013). Most importantly, the use of both research methods enables the present study to gather specific information relevant to the purpose of the study. A further discussion on these instruments is deliberated in the following sections.

In evaluating a concept or theory in quantitative approach, there are two issues, namely, reliability and validity, which merit careful consideration by researchers. Reliability relates to the "consistency of measures", while validity emphasises on the relevancy of measures in depicting the concept (Bryman and Bell, 2007, p. 164). These two elements determine the accuracy of the measurement to quantify a concept or theory of interest. For example, if a test is developed to measure a concept, the reliability of each item (or question) must be accessed to ensure they are measuring the same thing, and that the items should relate to the concept, not some other concepts to get valid data. Thus, in formulating the instruments for hypotheses testing in the present study, adequate procedures have been taken into consideration to ensure the reliability and validity of the measures. A further discussion on this particular issue is presented when discussing about data collection and analysis of data.

4.2 Sample Selection

The population of interest in this study included all companies listed on the Main Market (formerly known as Main Board) of Bursa Malaysia. This is congruent with the objective of this study to investigate the extent of EMA implementation in Malaysian PLCs following the CSRR mandate. Based on the list released by Bursa Malaysia (as at 24th February 2012), a target population of 835 companies was identified.

According to Bursa Malaysia's industry classification, there are 13 sectors in which companies are segmented into: close end funds, constructions, consumer products, finance, hotels, industrial products, inter-process communication (IPC), mining, plantations, properties, real estate investment trusts (REITs), technology and trading/services. For the purpose of the present study, these sectors are categorised into two categories, namely, environmentally sensitive industries and less sensitive industries. Prior literature considers chemical, constructions, plantations, transportation, mining and resources, petroleum (oil/gas), property and industrial products sectors as environmentally sensitive industries (e.g. Deegan and Gordon, 1996; Frost and Wilmshurst, 2000; Ahmad et al., 2003; Nik Ahmad and Sulaiman, 2004; Jaffar, 2006; Alrazi et al., 2009; Buniamin, 2010).

Consistent with the abovementioned prior studies, using the industry classification set out by Bursa Malaysia, this study considers five sectors as environmentally sensitive industries: constructions, plantations, properties, mining and industrial products. The remaining eight sectors: consumer products, finance, hotels, trading and services, technology, IPC, REITs and close end funds, are considered as environmentally less sensitive industries.

Referring to information in Table 4.1, of the 835 companies in the target population, 436 companies involve in environmentally sensitive industries, while 399 companies in less environmentally sensitive industries.

Table 4.1: Sector Representation of the Population

Industry Classification		N	%
Environmentally sensitive:			
Industrial Products		258	30.9
Constructions		44	5.3
Plantations		41	4.9
Properties		92	11.0
Mining		1	0.1
	Total	436	52.2
Environmentally less sensitive:			
Hotels		4	0.5
IPC		7	0.8
Close End Funds		1	0.1
Finance		35	4.2
Consumer Products		137	16.4
REITs		15	1.8
Technology		29	3.5
Trading/Services		171	20.5
	Total	399	47.8
Total		**835**	**100.0**

During the process of gathering the respondents' names and addresses via telephone calls and e-mails, 14 companies indicated that they were not interested to participate in the survey and one company requested the questionnaire to be sent to the Holding Company which was also included in the population. A further investigation on the listing status of companies at the time of study showed that 16 companies were delisted or in the delisting stage (PN17[28] companies). In addition, one company did not have a complete address and two companies had participated in the pilot test. These reduced the final sample size to only 801 public listed companies (PLCs). The result of sample selection is summarised in Table 4.2.

[28] A PN17 company is a listed company that is financially distressed or does not have a core business.

Table 4.2: Summary of Sample Selection Procedures

Description	N
Total population companies	835
Total companies not participating	(14)
New listing status – delisted and PN17	(16)
Others	(4)
Total sample	801

Accordingly, the sample size for the content analysis of corporate annual reports was determined by the number of survey respondents. Given the present study seeks to examine the association between the extent of EMA implementation and ER practices of companies, only the corporate annual reports of the survey respondents were assessed. To do this, the annual report for the financial year end 2011 was chosen because of two reasons: first, it was the latest year of annual reports available at the period of study, and second, they represented the post-effect after the regulation of CSRR in 2007. Given the 4-year gap after the introduction of the framework, there could be some visible and positive development in the environmental management practices of Malaysian PLCs.

4.3 Data Collection

Two research methods, namely, postal questionnaires and content analysis of corporate annual reports were employed for data collection. Postal questionnaires were used to gather data on the extent of EMA implementation and content analysis of corporate annual reports was carried out to assess the quantity and quality of ER of the sample companies. The employment of such mixed-methods was primarily driven by the intention of the present study to examine the association between the extent of EMA implementation and ER practices. To accomplish this objective, the use of single approach to collect data to meet the purpose is not adequate given that both variables are emanated from diverse sources. Each approach is discussed in turn.

4.3.1 Postal Questionnaires

In examining the extent of EMA implementation in Malaysian PLCs where such information is not readily-available for an assessment, postal questionnaires approach was adopted. This approach was selected for several reasons. First, it is the best option when the sample is geographically scattered and that it helps to reduce time and cost (Bryman and Bell, 2007). Second, it enables the respondents to answer at their own convenience without having pressure on immediate responses (Ferreira et al., 2010). However, a careful consideration is necessary as there is always a potential for 'non-response' bias and low response rate. Prior research (e.g. Wilmshurst and Frost, 2000; Frost and Seamer, 2002; Ferreira et al., 2010; Ribeiro and Aibar-Guzman, 2010; Jalaludin et al., 2011; Christ and Burritt, 2013) has employed postal questionnaires in examining companies' internal environmental management practices.

4.3.1.1 The Instrument

A structured questionnaire was constructed based on existing instruments derived from prior literature (i.e. Frost and Wilmshurst, 2000; EBEB, 2001[29]; Frost and Seamer, 2002; Ribeiro and Aibar-Guzman, 2010) with several new questions added to suit with the purpose of the present study. The questionnaire was segmented into five sections (refer to Appendix A) as follows:

i. *Section 1: Background of the company* – demographics;
ii. *Section 2: Environmental Management Accounting (EMA)* – to examine the extent of EMA implementation of companies;
iii. *Section 3: Environmental Department* – to examine whether there is an environmental department or personnel within the companies to oversee the environmental activities;

[29] The European Business Environmental Barometer (EBEB) (2001) is a joint research programme of 10 research institutes examining the environmental management practices of companies in several European countries.

iv. *Section 4: Environmental Management System (EMS)* – to identify whether companies are aware of the environmental issues related to their business activities; and

v. *Section 5: Environmental Reporting (ER) practices* – to examine whether there is a specific department and whether the accounting/finance department involved in the preparation of companies' ER.

Section 1 covered the demographics questions to include name of company, industry classification, type of company and location of company. The respondents were requested to provide the company's name in which they are belong to, to allow the researcher to assess the individual company's environmental disclosure in the corporate annual report. This was to ensure the assessment of the association between the extent of EMA implementation and ER practices is feasible. Since the respondents need to disclose their company's names, they were made aware that their participation is voluntary and that the responses are analysed in strictly confidential. A similar method was employed in Frost and Seamer's (2002) study which examined the association between the development of environmental management practices and the quantity of ER.

Section 2 sought to examine the extent of companies' EMA implementation. Following Frost and Wilmshurst's (2000) EA perspectives, the present study resolved in constructing a scale (hereafter TEMA scale) to measure the extent of EMA implementation, encompassing three subscales as follows:

i. *Inclusion of environmental information within existing MASs* – to examine whether companies properly identify and allocate their environmental cost in the existing management systems to assist the decision-making process.

ii. *Stand-alone environmental accounting procedures* – to identify whether companies have appropriate or specific accounting tools to handle or manage certain environmental issues.

iii. *Environmental cost-benefit analysis* – to determine whether companies recognize the significance of environmental issues within their decision-making processes.

Despite the fact that Frost and Wilmshurst (2000) looked at five perspectives[30] of environmental accounting in examining the development of environmental-related management accounting, in the same paper, the authors remarked that,

> At the core of environmental-related management accounting should be the development of appropriate mechanisms for identifying and allocating costs associated with environmental activities and in the development of environmental performance indicators that provide managers with both financial and non-financial information relevant for decision-making (Frost and Wilmshurst, 2000, p. 346).

Thus, the present study espouses the idea that at the most basic level, the EMA implementation may well be examined through the adoption of the abovementioned EMA subscales which largely emphasise measuring and managing environmental performance.

Nonetheless, for the purpose of the present study, the ER practices of companies are assessed separately through content analysis of corporate annual reports. A discussion about this particular instrument and its related issues will be offered in greater depth in a separate sub-section that follows. Pertaining to environmental audit, the respondents were asked whether their company undertakes compliance and EMS audits. A compliance audit refers to the assessment of companies' environmental activities that is intended to conform with legal standards/requirements set by the government, while an

[30]Inclusion of environmental information within existing management systems, stand-alone environmental accounting procedures, environmental cost-benefit analysis, environmental audit and environmental reporting.

EMS audit requires those with ISO 140001 accreditation to perform periodic assessments to ensure the system is properly developed and maintained in accordance to the standard (ISO, 2009).

As far as the questionnaire design is concerned, the limitation of Frost and Wilmshurst's (2000) study is addressed in the present study. Frost and Wilmshurst (2000) argue that the use of dichotomous generalisation of industries, that is, environmentally sensitive and less sensitive industries, seems to ignore specific environmental issues in which a more refined industry classification was deemed necessary. However, such a problem may also be attributed to the level of measurement used in their study. More specifically, the use of a dichotomous scale ("yes" and "no") in Frost and Wilmshurst's study to measure the extent of EMA implementation may dampen opportunities for more details about the issue. Therefore, the use of a Likert-scale (including a 'Not Applicable' [N/A] option) in the present study would provide a more appropriate measure in examining the extent of EMA implementation. Given a broad range of industries, N/A is an indicator of items that is not applicable to a particular industry. This will be discussed in a greater detail in the measurement of variables section.

Altogether, the TEMA scale consists of 29 items divided into three subscales as shown in Table 4.3.

Table 4.3: Items Included in the TEMA Scale

	Items	Source of construct
Inclusion of environmental information within existing MASs:		
INC1	The costing system	Frost and Wilmshurst (2000); Frost and Seamer (2002); Ribeiro and Guzman (2010)
INC2	The budgeting system	
INC3	Capital budgeting and expenditure	
INC4	Investment appraisal	
INC5	Performance measurement and appraisal	
INC6	Internal reporting mechanisms	
INC7	Risk assessment	
INC8	Purchasing policy	
INC9	Plant maintenance	
Stand-alone environmental accounting procedures:		
STA1	Waste, emissions and effluents	Frost and Wilmshurst (2000); Frost and Seamer (2002)
STA2	Raw materials usage	
STA3	Energy usage	
STA4	Recycled materials usage	
STA5	Returnable packaging/containers	
STA6	Pollution (i.e. air, water, land)	
STA7	Land remediation/Accounting for rehabilitation	
STA8	Environmental contingent liabilities	
STA9	Life cycle cost analysis in product development	
STA10	Compliance costs of environmental regulations	
STA11	Environmental costs in production costs	
Environmental cost-benefit analysis:		
ECA1	Energy efficiency	Frost and Wilmshurst (2000)
ECA2	By product use	
ECA3	Recyclable containers/packaging	
ECA4	Waste management	
ECA5	Pollution minimization/prevention	
ECA6	Environmental contingent liabilities	
ECA7	Environmental compliance	
ECA8	Site contamination	
ECA9	Site clean-up	

Section 3 and 4 were adapted from the European Business Environmental Barometer (EBEB) (2001) survey. These sections intended to identify whether companies have an environmental department or personnel (functions) who regularly allocate some time to environmental issues, and whether companies have implemented an EMS and its related issues. In the latter section, besides the identification of companies' EMS adoption, the perceived significance of 11 identified environmental issues was also measured to identify whether companies are cognizant of their business environmental impacts. Such

information would provide a clear indication of the companies' environmental activities. The list of the environmental issues is as follows:

Items	
S1	Use of water
S2	Use of energy
S3	Use of non-renewable resources (e.g. coal, natural gas)
S4	Use of toxic inputs
S5	Solid waste
S6	Soil contamination
S7	Waste water
S8	Air emissions
S9	Noise pollution
S10	Smell pollution
S11	Landscape damage

The last section is where the new questions were added in, seeking to examine whether companies have a specific department responsible for preparing the environmental information for reporting purposes. In addition, to gain further insights on issues related to EMA implementation and ER practices, there was a free comments section at the end of the questionnaire where the respondents were asked if there is anything else they would like to say about the issues.

4.3.1.2 The Respondents

A postal questionnaire was administered to the CFO/Finance Director [31] of each company included in the survey. CFOs or Finance Directors were selected as the respondents because of two reasons:

i. they are directly involved in the development of corporate annual report (Haniffa and Cooke, 2005), and

[31] Some companies do not have Chief Financial Officer (CFO). However, Finance Director is also the one who handles the company's finances, and thus is sufficiently knowledgeable regarding the financial activities of the company.

ii. they would be aware of the company's attitude especially on the financial decision (Bebbington et al., 1994; Frost and Wilmshurst, 2000) and thus be able to provide the information needed for the present study.

To ensure the intended respondents received the questionnaire, the name of the CFO/Finance Director of each company was gathered. The quest was first conducted through analysing the corporate annual reports and companies' website. Companies without the information available from both channels were later contacted via telephone calls and e-mails to request for the information. In total, 481 names and positions were obtained. For those companies without the CFO's/Finance Director's name, the questionnaire was addressed to the Finance Department of the companies.

4.3.1.3 Instrument Validation

To validate the questionnaire survey, it was subjected to pre-testing and pilot test.

Pre-Testing the Questionnaire

Prior to its distribution, the questionnaire was pre-tested to assess the comprehensibility of the questions. Six accounting lecturers and five accountants participated in the pre-testing process from 23 April until 18 May 2012. The questionnaires were handed in personally to the lecturers, while the accountants were contacted through e-mails and telephone calls.

Much of the feedbacks were received from the lecturers. None of the accountants had problems with the questionnaire although one of them stated that some of the EMA items were not applicable to the company' business activities. Similarly, the inclusion of N/A options was suggested by some of the lecturers to address the non-applicability of EMA items to certain industries. In addition, issues concerning the use of negative

questions and unclear language were also addressed by some. Based on the feedbacks, N/A options were included in the Likert scale scoring for the TEMA scale. Adjustment on the wording and questions were also made to create more comprehensible questions and instructions.

Pilot Testing the Questionnaire

At the end of May 2012, a pilot test was conducted on a small sample of CFOs/Finance Directors to address any potential ambiguity in the questionnaire. Six CFOs/Finance Directors participated in the test and the selection of these participants was based on convenience sampling. Based on the feedbacks, none of the participants seemed to be concerned with the comprehensibility of the questionnaire as no issues were raised. Therefore, no changes were made to the questionnaire.

4.3.1.4 Survey Administration

The postal questionnaires were administered to CFOs/Finance Directors of 801 Malaysian PLCs on mid July 2012 until early January 2013 (6 months). A questionnaire was mailed together with a cover letter explaining the purpose of the study (refer to Appendix B) and a self-addressed stamped envelope in the attempt to increase the response rate. Three weeks after the initial mailing, a follow-up letter (refer to Appendix C) was posted to each non-responding companies. Following the first follow-up letter, a reminder letter was later sent on early October 2012 including a copy of the questionnaire and a self-addressed stamped envelope, in case of the respondents lost the questionnaire. A final reminder letter was sent to the remaining non-respondents on 10th December 2012.

4.3.2 Content Analysis of Corporate Annual Reports

The corporate annual report of the sample companies was assessed to determine the extent of their environmental disclosure, both in quantitative and qualitative measures. In particular, the content analysis of annual reports provides evidence on the extent to which the ER practices of companies is associated with extent of EMA implementation. The selection of the corporate annual report was driven by the fact that it is the best approach to study about the company, specifically on how they respond to certain issues (Bowman, 1984; Zeghal and Ahmed, 1990). Moreover, from 2007 onwards, all Malaysian PLCs are required to disclose their CSR information in the corporate annual report.

4.3.2.1 The Instruments

Two instruments were developed, one, to measure the quantity of ER and the other one, to measure the quality of ER. To measure the quantity of ER, an environmental disclosure checklist (refer to Appendix D) was developed to determine whether the information reported by companies pertains to environment. The checklist comprised of two components: environment and energy; and items for each component were derived from prior studies (Hackston and Milne, 1996; Williams, 1999; Deegan et al., 2002; Alrazi et al., 2009). Energy was included in the measurement of environment as both aspects go hand in hand, in such a way that the source of energy is derived from natural resources (e.g. water, coal, oil) and that the excessive consumption eventually would lead to environmental degradation, such as global warming. The environment was segmented into 8 main parts, namely, general environmental considerations, environmental policy, environmental audit, environmental product and process-related, environmentally financially related data, sustainability, environmental aesthetics and

others (e.g. biodiversity conservation, donation). Meanwhile, energy focused on the key strategic consideration relating to energy efficiency.

An environmental disclosure index (refer to Appendix E) was constructed to measure the quality of ER. The selection of items to be included in the disclosure index was mainly based on the GRI's *Sustainability Reporting Guidelines* (GRI, 2011). Besides the GRI's reporting guidelines, items were also derived from a review of extant literature (i.e. Clarkson et al., 2008; Alrazi et al., 2009; Beck et al., 2010) and the CSRR Framework developed by Bursa Malaysia. Altogether, the disclosure index concentrated on the following 8 categories:

- corporate environmental commitment and strategy;
- environmental initiatives and achievements;
- environmental governance structure;
- environmental compliance;
- environmental performance index (EPI);
- environmental financial data;
- stakeholder engagement; and
- report scope and design.

4.3.2.2 Instruments Validation

Three accounting professors in social and environmental reporting area (labelled as **AP1**-**3**) and a professional (**P1**) from the industry (i.e. Head of CSR Asia) performed the content validity of the environmental disclosure checklist and index. All the experts were contacted through e-mails. While none was concerned with the disclosure checklist (to quantify quantity of ER), all the experts expressed concerns on the disclosure index (to quantify the quality of ER), particularly on the scoring and items to be measured. In terms of scoring, the feedbacks were centred on the possibility of companies to have all listed items applicable to them. One expert said,

> There are companies in which their key environmental impact might be less than 5 [items measured]. This needs to be properly taken into account when you calculate the possible maximum score for these companies. (**AP1**)

Another expert expressed concern,

> There is a range of information that you could say about [emissions/effluent (for both targets and performance)]. For example: "we have effluent", "we are managing our effluent and are within environmental guidelines" and "it is costing us $40 million dollars to manage our effluent" are three different ways to talk about effluent. The quality of information differs. Do you want to reflect that quality factor in your index?(**AP2**)

As regards the selection of items to be measured, one expert recommended,

> I would recommend that adherence to third-party certification schemes such as the RSPO or Green Building index should also be added and for environmental guidance/standards – ISO would come under EMS…I would not include ACCA's guideline. Although it is good, the only robust standard is GRI. (**P1**)

Meanwhile, another expert remarked,

> Have you incorporated the MaSRA (ACCA)/NACRA [awards for sustainability reporting in Malaysia] items? (**AP3**)

All the feedbacks received were carefully addressed. In particular, to address the ascended scoring issue, an unweighted index method was employed, while items in the index were revised by triangulating them with the ACCA's guideline, literature reviews and GRI items to ensure they fit for the purpose of the study. These are addressed in the following section.

4.4 Data Analysis

This section concerns with presenting the analysis of the data. Data in the present study were analysed using SPSS Version 20.0. The additional comments made by companies in the space provided at the end of the questionnaire were also compiled. No specific or

rigorous analysis, however, was undertaken in this respect where the comments were basically organised into several themes and reported in a narrative form.

4.4.1 Data Screening

Prior to performing the statistical analyses, data were screened for errors, outliers and missing values. This helps to minimise problems relating to inaccurate or invalid statistical results (Tabachnick and Fidell, 2007; Field, 2009; Hair et al., 2010; Pallant, 2011) which will create a distortion in statistical discussions by misrepresenting the actual information. To identify any wrongly entered code or values in the data set of the present study, a series of preliminary analysis were performed. The FREQUENCIES analysis was performed for categorical variables and DESCRIPTIVES for continuous variables to check for any abnormality. In consideration of the presence of missing data in every study is common, the treatment of such concern is discussed in the following section.

4.4.1.1 Treatment of Missing Data

Missing data is to be expected in almost all empirical research either as a result of errors from data collection or data entry or 'skipped patterns' where some respondents omit certain questions which are not applicable or unable to provide answers (Tabachnick and Fidell, 2007; Hair et al., 2010). Missing data can result in biased results, reduced statistical power and affect generalizability, especially if the missing data are not random. Therefore, it is of importance to determine the extent and types of missing data prior to performing any statistical analysis.

There are generally three types of missing data as originally proposed by Little and Rubin (1987), which are: i) missing completely at random (MCAR), ii) missing at

random (MAR) and iii) missing not at random (MNAR). MCAR is when missing value of a dependent variable (*Y*) is not related to the independent variable (*X*) and MAR is when missing value of *Y* is related to *X* only (Allison, 2002; Tabachnick and Fidell, 2007; Hair et al., 2010). MCAR and MAR are also denoted as 'ignorable missing data' of which no specific remedy to model the missing data is required (Allison, 2002). The conventional approach to deal with this type of missing data is through listwise or pairwise deletion. In fact, both listwise and pairwise deletion are the most common methods for handling missing data in research. Listwise deletion (or complete-case analysis) excludes the entire case from the analysis if any of the variables is missing, while pairwise deletion (or available-case analysis) discards only the data with missing value from the analysis involving the data. The practical impact of listwise and pairwise deletion is the reduction of sample size available for analysis (Hair et al., 2010). Imputation is perhaps a modern approach to deal with random missing data. It is a process of replacing missing data with substituted values so that the number of cases can be retained. It comes with several techniques, such as mean-substitution, regression-substitution and maximum-likelihood (ML). Each of these techniques has its own merits and it is up to the researcher to choose the best approach depending on the collected data (Hair et al., 2010). In this regard, Tabachnick and Fidell (2007) point out that unless the missing data is less than 5%, any of the techniques would yield similar results.

Of greater concern is MNAR or also referred to as 'non-ignorable missing data'. MNAR is when missing value of *Y* is related to the observation of *Y* itself (Allison, 2002; Tabachnick and Fidell, 2007; Hair et al., 2010). Non-randomly missing data require a specific model to address the missingness and that listwise and pairwise deletion or imputation techniques are not the elegant ways of handling this type of missingness (Allison, 2002).

There is, however, no specific threshold concerning the acceptable missing data although missing data greater than 20% are often associated with poor study validity. Nonetheless, such a rule of thumb has "no statistical justification and oversimplifies the problem" as biasness may also stem from the type of missing data as well as the selection of analysis technique itself (Dziura et al., 2013, p. 353). To support this, Hair et al. (2010) argue that as long as the number of cases with no missing data is sufficient for the selected analysis technique and that the missingness is at random, the extent of missing data is not a serious concern. In the present study, the extent of missing data was assessed via the FREQUENCIES (for categorical data) and DESCRIPTIVES (continuous data). To make the most use of available information, only variable with more than 50% of missing data was excluded from the analysis. This threshold was decided based on the best judgement of the researcher to ensure that while trying to maximise the number of cases used in the analysis, the research questions can be adequately answered.

Within the TEMA scale, missing data related to N/A responses were highly expected as some of the items might not be applicable to all companies due to the nature of business activities. However, it is important to note that N/A responses in the scale were *missing-by-design* or *user-defined* missing data. In particular, N/A responses were considered as if the non-applicable items were not asked to the non-respondents. It is plausible for *missing-by-design* to be MAR (Schafer, 1997). In the present study specifically, as N/A option was included to address the non-applicability of items to certain industries, there is a high probability for MAR. While it is not a great concern if data is MAR as they still can be analysed using those of similar analysis as MCAR (Allison, 2002), such an investigation is essential, regardless, to avoid biased results (Gelman and Hill, 2006). More specifically, if a dependent variable is MAR, all the variables that affect the

probability of missingness must be included in the regression model to avoid nonresponse bias (Gelman and Hill, 2006).

To determine whether N/A responses relate to environmental sensitivity of industry, correlation analysis was performed between the variables. The missingness was measured by the frequency of N/A responses per individual response. A significant correlation suggests that the data is MAR. It is, however, difficult to attest whether the data is MCAR, but there is a test that can provide evidence against MCAR. In particular, a Little's MCAR test with a significant *p*-value ($p > 0.05$) indicates that missingness is not at random. The test can be performed using an add-on analysis in the SPSS called Missing Value Analysis (MVA) (included in SPSS Version 16 and later).

Overall, missing data in the present study was addressed using pairwise deletion method, unless stated otherwise.

4.4.2 Measurement of Variables

This section focuses on the measurement of variables. The discussion is divided into two parts. The first part looks at the variables relating to the first and second objectives, that is, the extent of EMA implementation and factors influencing the implementation. The second part looks at the variables relating to the third objective – the association between EMA implementation and ER practices.

4.4.2.1 Corporate Characteristics and the Extent of EMA Implementation (Contingency Model)

Dependent Variable – The Extent of EMA Implementation

A TEMA scale comprising 29-item with three subscales was developed to measure the extent of EMA implementation. Following Frost and Wilmshurst (2000), the three subscales are:

i) Inclusion of environmental information within existing MASs (INC subscale);

ii) Stand-alone environmental accounting procedures (STA subscale); and

iii) Environmental cost-benefit analysis (ECA subscale).

Respondents were asked to indicate their company's level of usage of the items on a five-point Likert scale, ranging from 1 (Never) to 5 (Very Often). A N/A option was also offered and coded as "missing". N/A responses were excluded from the calculation of means and standard deviations (SDs). It is commonly accepted in empirical research to allow some missing data in the aggregation of scale score to retain maximum sample size, particularly for small sample size, provided that the missingness is at random. Imputing missing data related to N/A responses was not possible as it would be a misleading measure of companies' extent of EMA implementation. This is because, N/A responses were not skipped responses, but instead, those were indeed responses provided by the respondents. However, if the responses were included in mean score calculations, the extent of implementation may not be adequately represented as N/A indicates that the relevant item does not apply to them.

To compute the TEMA as well as its three subscales mean scores, the available-case analysis (i.e. pairwise deletion) was employed in an attempt to keep data loss to a

minimum. In particular, as N/A responses within the TEMA scale were relatively high (this will be discussed in a greater detail in the next chapter), employing a complete-case analysis (i.e. listwise deletion) would have reduced the sample size tremendously. Moreover, because listwise deletion only accounts for those with all applicable items, ignoring those with one or more N/A responses may create bias in results. Therefore, such an approach was not pursued. Although there are no clear-cut rules regarding the minimally acceptable missing data in the calculation of scale score, in the present study, if more than 50% of the items in the scale were missing (or N/A), no subscale score was calculated. The subscale score was computed as the mean value for those who have valid responses on at least half of the items within the subscale. The TEMA score was not calculated if more than two subscales were missing. The TEMA score was computed by averaging the total valid responses. The higher the TEMA score, the greater is the EMA implementation.

Next, using the TEMA score, companies were then grouped into three social issue life cycle phases: Policy, Learning and Commitment. Such a categorisation aims to ensure that the consistency of the TEMA variable is maintained for both contingency and social issue life cycle models (see Figure 3.1 for the theoretical framework). The cut-off points were carefully determined to reflect the characteristics of social issue life cycle theory as discussed by Nasi et al. (1997). It must be emphasised here that this measurement is self-developed and has not been used in the prior literature. Nonetheless, the procedures were carefully planned and conducted to meet the purpose of the analysis. Given the responses to the items measuring the TEMA were based on a 5-point Likert scale (1 – 5), those with mean scores greater than or equal to 3.6 were classified as Commitment – representing a high extent of EMA implementation. Mean scores between 2.0 and 3.59 were classified as Learning – representing a moderate

extent of EMA implementation; while mean scores below 2.0 were classified as Policy – representing a low extent of EMA implementation. It is worthy to note that while reflecting the characteristics of social issue life cycle theory, these cut-off points were also deliberately chosen to ensure that the number of observations in each category was large enough to facilitate statistical testing. The social issue life cycle phases reflect a value ranging from 1 to 3 as follows:

Social Issue Life Cycle Phase	Cut-off Point
Policy = 1	TEMA score ≤ 2.00 (Low extent)
Learning = 2	TEMA score ranging from 2.01 to 3.59 (Moderate extent)
Commitment = 3	TEMA score ≥ 3.60 (High extent)

Independent Variables – Corporate Characteristics

In examining factors influencing the extent of EMA implementation, five corporate characteristics have been considered as follows:

Corporate Characteristics	Abbreviation	Measures
Environmental sensitivity of industry	IND	Dummy: Sensitive = 1; Less-sensitive = 0
Company size	SIZE	Total assets (log-transformed)
Ownership status	OWNER	Dummy: GLC = 1; Non-GLC = 0
EMS adoption	EMSA	Dummy: Adopted EMS = 1; Not adopted EMS = 0
Proportion of NEDs	PNED	% of NEDs to total number of directors

Environmental sensitivity of industry (IND) – The respondents were asked to indicate their industry based on the 14 industries as classified by Bursa Malaysia. The industries were then dichotomised into two categories: environmentally sensitive and less sensitive industries, based upon the classification made in prior studies (e.g. Deegan and Gordon, 1996; Frost and Wilmshurst, 2000; Ahmad et al., 2003; Nik Ahmad and Sulaiman, 2004; Jaffar, 2006; Alrazi et al., 2009; Buniamin, 2010) (refer to Section 4.2).

Dummy variable was created for IND (sensitive = 1; less-sensitive = 0) for it to be included in the multivariate analysis.

Company size (SIZE) – The utilisation of total assets as a proxy for company size in environmental accounting research is widespread, for example, Frost and Seamer (2002), Ahmad et al. (2003), Cormier and Magnan (2003) and Buniamin (2010). There are also studies that used number of employees and total sales to measure company size, for example, Christ and Burritt (2013) and Ferreira et al. (2010). In this regard, Dalbor et al., (2004) found that among the various proxies, total assets and number of owners have the strongest explanatory powers for company size. They also emphasised that the employment of two or more proxies for size would add unnecessary noise to the results. The present study, therefore, used total assets as a proxy for SIZE and non-normality was log-transformed. SIZE was extracted from the sample companies' corporate annual reports.

Ownership status (OWNER) – The respondents were asked about their company's ownership status, in particular, whether they are GLCs or non-GLCs. Similar to IND, this binary variable was also dummy-coded: GLCs = 1; non-GLCs = 0.

EMS adoption (EMSA) – The postal questionnaire collected information regarding companies' EMS adoption on the basis of "Yes", "No", or "Considering". This variable was later dummy-coded to Adopted EMS = 1 for "Yes" response, and Not adopt EMS = 0 for "No" and "Considering" responses.

Proportion of NEDs (PNED) – Following previous studies such as Haniffa and Cooke (2005), Brammer and Pavelin (2006, 2008), Said et al. (2009), Esa and Mohd Ghazali

(2012), PNED was measured as a ratio of the number of NEDs to total number of directors. PNED was extracted from the sample companies' corporate annual reports.

4.4.2.2 The Extent of EMA Implementation and ER Practices (Social Issue Life Cycle Model)

Dependent Variables – Quantity and Quality of ER

Quantity of ER (QTER)

In line with Gray et al.'s (1995b, p. 84) suggestion that "sentences are to be preferred if one is seeking to infer meaning", Milne and Adler (1999) argue that the sentence count provides a far more reliable measure than word and page count methods for two reasons: first, the latter would essentially add 'unnecessary unreliability' in analysing social and environmental disclosures; and second, individual words without sentences to provide the context, convey no meaning. In this connection, Hackston and Milne (1996) mentioned that the problems associated with portion of pages and words count as indicated above can be alleviated with the use of sentences as measurement unit.

The present study, therefore, employed the sentence count to measure QTER. Using the developed environmental disclosure checklist (see Appendix D), for every sentence related to environmental information, a score was accumulated. The score denotes the total number of sentences of environmental information reported in the companies' annual reports.

Quality of ER (QLER)

QLER was measured using an environmental disclosure index (see Appendix E). The index comprised of 52 items and each item was coded: a score of "1" was given if the company disclosed such information and "0" if there was no evidence found on such

information. Redundant disclosure was scored only once (Guthrie et al., 2006). Consistent with Owusu-Ansah's (1998) suggestion, the dichotomous or unweighted index method was employed to minimise the unnecessary subjectivity in the researcher's judgment. Most importantly, the employment of this particular approach was intended to address the feedbacks received from the experts (for construct validity) regarding the scoring.

Overall, for the 52 items, a total disclosure score of 100 was allocated. To avoid penalising companies for non-disclosure of certain environmental information, or more directly, for activities/items that are irrelevant to the business, a relative index score was calculated for each company (Cooke, 1989; Owusu-Ansah, 1998; Alrazi et al., 2009). The total disclosure score for a company is additive,

$$\boldsymbol{Total\ Disclosure\ Score\ (TDS)} = \sum_{\boldsymbol{i=1}}^{\boldsymbol{n}} \boldsymbol{d_i}$$

where, $d = 1$ if d_i is disclosed; 0 if d_i is not disclosed, and $n = 100$

If there is an irrelevant item for the company, the maximum disclosure score is calculated as follows:

$$\boldsymbol{Total\ Maximum\ Score\ (TMS)} = \sum_{\boldsymbol{i=1}}^{\boldsymbol{n}} \boldsymbol{d_i}$$

where, d = expected item of disclosure, and $n \leq 100$

Therefore,

$$\boldsymbol{Total\ Index\ Score\ (TIS)} = \frac{\boldsymbol{TDS}}{\boldsymbol{TMS}} \times \mathbf{100}$$

From this section onwards, QLER refers to the *TDS* or *TIS*.

In deciding whether an item is not applicable or irrelevant to the companies, there are several measures to adhere to. These include:

i. there must be a brief indication made in the report that the item is not applicable to the company (GRI, 2011). For example, if a finance company mentions that its business activities do not impact the environment in a significant way, but in the same report, it mentions about minimising the use of paper, energy and water consumption, scores only be recorded for these mentioned impacts. The other environmental impacts such as air emissions, biodiversity and noise pollution are omitted from the calculation, and therefore, treated as 'not applicable'.

ii. as proposed by Cooke (1989), it is necessary to read the corporate annual report thoroughly before making a judgment. For example, if the company states elsewhere in the annual report that there is no public sanction or penalty imposed on the company (including its subsidiaries) during the financial year, although there is no explicit reference made to environmental issues, it is, however, certain that items regarding environmental prosecution and total fines paid are not applicable and thus excluded from the calculation of the total disclosure score.

Independent Variable – Social Issue Life Cycle Phases

Considering EMA is relatively an emerging issue in Malaysia, it must be emphasised here that the categorisation of companies into the social issue life cycle phases did not aim to have an equal sample size for each group. Rather, it attempts to reflect as close as possible to the characteristics of social issue phases as discussed in Nasi et al.'s (1997) study. Nonetheless, necessary measures have been taken into consideration to address the unequal sample. This will be discussed in greater details later in this chapter.

4.4.3 Reliability and Validity of the TEMA Scale

Reliability and validity are two fundamental concepts of measurement in questionnaire design which determine whether the items within the scale are measuring the same construct (Bryman and Bell, 2007; Pallant, 2011). It is very important to perform both tests as a scale may reliable but not necessarily valid, or vice versa. In the present study, the validity of the TEMA scale was assessed via principal components analysis (PCA), while the reliability of the scale was measured using Cronbach's alpha (α).

4.4.3.1 Scale Validity – Principle Components Analysis (PCA)

A validity of a scale concerns with how well the concept is defined by the measure or scale (Hair et al., 2010). PCA is appropriate for data reduction purposes especially for less established measure (Christ and Burritt, 2013) as used in the present study. Before PCA can be conducted, it is essential to assess the suitability of data to ensure it is fit for the analysis and that the factor solution(s) is reliable.

The suitability of data for PCA is based upon several assumptions. First, as regards sample size requirement, there are no absolute thresholds in a minimum sample size. For example, Hair et al. (2010) suggest that there should be at least 50 observations/cases or in terms of ratio, a minimum of 5 observations per variable. Whilst, Tabachnick and Fidell (2007) recommend at least 300 cases. Comrey and Lee (1992) consider a sample size of 100 as poor, 200 as fair, 300 as good, 500 as very good, and 1,000 or more as excellent. In other words, the larger the size, the more reliable are the PCA results. There is also another view that suggests the sample size is conditional upon the factor loadings. Preacher and MacCallum (2002, p. 160) argue that small sample should be not a great concern "as long as communalities are high, the number of expected factors is relatively small, and model error is low (a condition which often

goes hand-in-hand with high communalities)". Similarly, Field (2009) contends that regardless of sample size, factor solutions are reliable if a factor has four or more loadings greater than 0.6. With regard to this, Hair et al. (2010) proposed the sample sizes necessary for each factor loading value to be considered significant. That is, for a sample size of 50 (minimum), the factor loadings should be at least 0.75 and for a sample of 350 (maximum), factor loadings of 0.3 is necessary. Simply put, the smaller the sample size, the higher the factor loading is necessary to the factor solutions to be reliable.

Second, PCA also requires correlations between items in the scale – inter-correlations. There is a clear consensus on the magnitude of correlation where it should be greater than 0.3 with at least one other item (Tabachnick and Fidell, 2007; Field, 2009; Hair et al., 2010). However, it also has been suggested that the inter-correlations between items should not be greater than 0.9 as it would indicate redundancy or multicollinearity. Nonetheless, Field (2009) contends that in PCA, multicollinearity is not a great concern unlike in explanatory factor analysis. Therefore, as long as there is a correlation ($r > 0.3$) with at least one other item, the inter-correlations assumption for PCA is met.

Apart from the above thresholds, the diagnostic tests of Kaiser-Meyer-Olkin measure of sampling adequacy (*KMO*) and Bartlett's test of sphericity (χ^2) also facilitates the determination of data adequacy for factor analysis, perhaps, through more complex measures. Both measures can be performed directly using the SPSS. The *KMO* statistics greater than 0.5 suggests that the items within each dimension are likely to factor well and the Bartlett's *p*-values less than 0.05 indicates that there is a significant correlation between items (Field, 2009; Hair et al., 2010). A more stringent rule of thumb is

proposed by Tabachnick and Fidell (2007) where a *KMO* of 0.6 is set as a minimum criterion.

There are two techniques in relation to the rotation method in PCA, namely, the orthogonal and oblique rotation. Orthogonal rotation – i.e. varimax, quartimax and equamax; assumes that factors or components are not correlated (i.e. independent), while oblique rotation – i.e. direct oblimin and promax; assumes that all factors or components are correlated (Tabachnick and Fidell, 2007). Direct oblimin is the most widely used of oblique rotation technique while varimax for orthogonal rotation technique.

4.4.3.2 Scale Reliability – Cronbach's Alpha (α)

Reliability measures the extent to which a variable or set of variables is consistent with its objective (Hair et al., 2010). Cronbach's α is the most common measure of scale reliability. In a widely referred work of Nunnally (1978) with regard to reliability coefficient, the author recommends a minimum value of 0.7 for preliminary research.

In social science research, a Cronbach's α value of 0.7 or higher indicates good internal consistency reliability (Malhotra, 2010; Pallant, 2011). Nonetheless, Cortina (1993) as quoted by Field (2009) argues that a high value of cronbach's α may sometimes be attributed to the number of items on the scale of which the higher the number of items, the higher the value of Cronbach's α. To avoid this problem, Field (2009) suggests that Cronbach's α cannot be used to measure unidimensionality. More specifically, if the scale comprises several factors or subscales, the Cronbach's α value for each factor or subscale needs to be computed separately. Moreover, it is of importance to conduct data

reduction techniques, such as PCA or factor analysis, on a set of items prior to conducting a reliability analysis (Hair et al., 2010).

4.4.4 Reliability Issues Related to Content Analysis of Annual Reports

The issue of reliability of the coding output may likely to surface especially if the content analysis is carried out by a single coder. It has been suggested that a pilot test of content analysis would help the coder to familiarise with the analysis so as to enhance the reliability of the actual coding output (Milne and Adler, 1999; Guthrie and Abeysekera, 2006). Thus, a pilot content analysis was conducted on a sample of 20 randomly selected corporate annual reports prior to the actual content analysis.

Furthermore, Krippendorff (2004) suggests a *test-retest* reliability measure to be conducted to assess the consistency of the coding output. Although the *test-retest* provides the weakest support for reliability in comparison to *reproducibility test* and *accuracy test* (other tests for reliability as proposed by Krippendorff (2004)), considering that the analysis was undertaken by a single coder for the purpose of completing the present study, it was deemed as the most appropriate and reasonable method to apply. Consequently, two months after the actual content analysis, 20 annual reports were randomly selected from the final sample and coded for the second time, consistent with Krippendorff's (2004) suggestion to ensure the reliability of the output.

4.4.5 Model Specification – Corporate Characteristics and the Extent of EMA Implementation

To examine the association between corporate characteristics: IND, SIZE, OWNER, EMSA and PNED; and the extent of EMA implementation, the following ordinal logistic regression model is used:

$$\boldsymbol{TEMA = \beta_0 + \beta_1 IND + \beta_2 SIZE + \beta_3 OWNER + \beta_4 EMSA + \beta_5 PNED + \varepsilon}$$

where,

TEMA = Social issue life cycle phases: Policy, Learning and Commitment
IND = Value "1" for sensitive and '0" for less sensitive
SIZE = Total assets (log-transformed)
OWNER = Value "1" for GLC and "0" for non-GLC
EMSA = Value "1" for adopted EMS and "0" for not adopt EMS
PNED = Percentage of NEDs to total number of directors
ε = error

4.4.5.1 Ordinal Logistic Regression Analysis Assumptions

Ordinal logistic regression and multiple regression are analogous in that one or more independent variables are used to predict a single dependent variable. However, as the name suggests, an ordinal logistic regression model assumes that the dependent variable is ordinal or non-metric.

Like all forms of multivariate analyses, the generalisation of results entails a fulfilment of certain thresholds regarding the sample size. Tabachnick and Fidell (2007) suggests the following formula: ($N > 50 + 8m$) in determining the sample size, where m = number of independent variables and N = sample size. However, Hair et al. (2010) proposed a more lenient criterion of a minimum ratio of 10:1, where for every independent variable, it should be at least 10 cases, although 15 to 20 cases are desired.

Ordinal logistic regression is less complicated than multiple regression in that it does not make any assumptions of normality, linearity and homoscedasticy for the independent variables (Hair et al., 2010). The main reason for this is that the dependent variable is non-metric, thus, automatically normality and linearity assumptions is violated (Field, 2009). It does, however, require no multicollinearity and outliers (Tabachnick and Fidell, 2007; Field, 2009; Pallant, 2011). In a statistical term, the

fulfilment of these assumptions ensures the results are free from Type 1 or Type 2 error (Tabachnick and Fidell, 2007). Type 1 error refers to the rejection of null hypothesis when it is true while Type 2 error refers to the failure to reject null hypothesis when it is false. Each of the assumption will be discussed in turn.

Multicollinearity

Multicollinearity is a situation in which two or more independent variables are highly correlated. A regression model with highly correlated variables may lead to biased parameters estimates of individual predictor (Field, 2009; Hair et al., 2010) which in turn significantly affect the reliability of the outcome or conclusion about the relationship between dependent and independent variables (Pallant, 2011).

Two types of multicollinearity tests were performed in the present study. First, the correlations between independent variables were examined via Pearson's correlation analysis. Pallant (2011) suggests that the correlation coefficients (*r*) exceed 0.9 indicates multicollilenarity. A more stringent correlation coefficient of 0.7 was proposed by Tabachnick and Fidell (2007). Second, as suggested by Field (2009), variance inflation factors (VIFs) and tolerance tests were also conducted. Tolerance is the degree to which one independent variable cannot be predicted by the other independent variables in the model (Pallant, 2011). It is calculated as $1 - R^2$. The VIF on the other hand, is the reciprocal of the tolerance and is measured by $1 / (1-R^2)$ (Pallant, 2011). These techniques are commonly used in multiple regression analysis for detecting multicollinearity. However, as the SPSS does not support the collinearity diagnostics in logistic regression, tolerance and VIF were tested using a linear regression analysis (Field, 2009). The general rule of thumb is, any tolerance value less than 0.10 and VIF greater than 10 indicate multicollinearity (Tabachnick and Fidell, 2007; Pallant, 2011).

However, Pallant (2011) stresses that these cut-off points sometimes allow for high correlations between variables and that the correlation matrix of the variables provides more reliable evidence to confirm the presence of multicollinearity.

Outliers

An outlier refers to a case that differs substantially from the general trend of the data. Outliers can affect the results of ordinal logistic regression significantly (Tabachnick and Fidell, 2007; Field, 2009; Hair et al., 2010; Pallant, 2011). Thus, it is of importance to ensure the data are free from outliers. Cases with standardised residual (ZRE) values of greater than ±2.5 (Pallant, 2011) or ±3.0 (Tabachnick and Fidell, 2007) are considered as outliers. Hair et al. (2010) pointed out that any ZRE value greater than ±4.0 signals an unacceptable degree of error and that the particular case should be excluded from the analysis to avoid bias. However, a large ZRE value (> 0.4) may also stem from sampling error. Therefore, before eliminating a case, a scrutiny of the data is crucial in that one or two of large residuals may be acceptable.

4.4.6 Model Specification – The Extent of EMA Implementation and ER Practices

In attempting to examine whether the extent of EMA implementation (measured by social issue life cycle phases) is associated with ER practices (QTER and QLER), the empirical model (in the form of null) is formulated as follows:

$$\boldsymbol{H = \left[\frac{12}{N(N+1)}\sum\frac{R_i^{\,2}}{n_i}\right] - 3 * (N+1)}$$

where, N = Total sample size; R_i = Sum of ranks for each group; n_i = size for each the group.

The employment of Kruskal-Wallis test which is a non-parametric statistic was due to the non-normality of dependent variables: QTER and QLER. The discussion on this particular issue will be presented in the following chapter when presenting the results of hypotheses testing.

4.4.6.1 Kruskal-Wallis Test Assumption

Although Kruskal-Wallis test is a non-parametric statistic where no restriction is placed on normal distribution, the test does assume homogeneity of variance. In other words, the data must be homoscedastic for the results of Kruskal–Wallis test to be accurate (Fagerland and Sandvik, 2009). A non-parametric Levene's test for non-normally distributed data is usually employed in this respect. In the SPSS, there is an option to perform this test statistically. If the non-parametric Levene's test shows significant *p*-value ($p < 0.05$), the null hypothesis that the distribution of values across groups is the same is rejected, indicating that the data is not homoscedastic. On the other hand, if the *p*-value is not significant ($p > 0.05$), the null hypothesis that the variances between groups are the same, cannot be rejected and that the data is homoscedastic.

4.4.7 Non-response bias

Debates on the use of mail survey or postal questionnaires in academic research have been centred on the issue of non-response bias (Armstrong and Overton, 1977). Non-response bias refers to a potential tendency of the survey respondents to provide different answers from those who did not respond to the survey (Armstrong and Overton, 1977). They further claim that if there is evidence of non-response bias, the results of the survey cannot be generalised to the population.

To test for a non-response bias, an independent-samples *t*-test was carried out to assess variances between early (ten earliest) and late (ten latest) responses on the TEMA scale of the sample companies. The ten latest (late) responses were the proxy for non-respondents. The comparison between the two groups suggests that, at the 5% significance level, there were no significant differences ($p > 0.05$) in the scores for all TEMA items between early and late responses. Thus, it is reasonable to assume that non-response bias is not significant in the present study.

4.5 Conclusion

This chapter discussed the research methods employed in the present study. In an attempt to provide answers to the research questions set out in the earliest chapter, a positivistic approach was opted. In particular, postal questionnaires and content analysis of annual reports were undertaken for data collection. The population for the present study, that is, the Malaysian PLCs, was deliberately chosen to best suit with the aim of the present study. In gathering responses of the postal questionnaires, the participants were made aware that their participation is voluntary and the responses will be analysed in strictly confidential.

Taking into consideration the possibility of the validity issues associated with the instruments used in data collection, several preventive measures had been considered. These include piloting the questionnaire, performing content validity of the environmental disclosure index with academic experts and a professional, performing *test-retest* of the coding output to address the reliability issue of a single coder, and pre-empting the use of weighted score in measuring the total disclosure score to avoid any possible biases in the researcher's judgment.

As far as data analysis is concerned, prior to performing any statistical analysis, preliminary tests were undertaken to ensure that the data set was free from errors and not violating the multivariate assumptions. PCA and Cronbach's α were performed to assess the validity and reliability of the scale. The operationalization of variables is summarised in Table 4.4.

Table 4.4: Operationalization of Variables

Variable	Abbreviation	Operationalization	Source of information
Environmental sensitivity of industry	IND	Dummy variable: 1 = Environmentally sensitive 0 = Less sensitive industries	Postal questionnaire
Company size	SIZE	Based on total assets (RM) (natural log transformation)	Annual report
Ownership status	OWNER	Dummy variable: 1 = GLCs 0 = Non-GLCs	Postal questionnaire
EMS Adoption	EMSA	Dummy variable: 1 = Adopted EMS 0 = Not adopt EMS	Postal questionnaire
The proportion of NEDs	PNED	Percentage of NEDs over total number of directors	Annual report
The extent of EMA implementation/ Social issue life cycle phases	TEMA/ Policy; Learning; and Commitment	Based on TEMA score: Policy = score ≤ 2.0 Learning = 2.01 ≤ score ≥ 3.59 Commitment = score ≥ 3.6	Postal questionnaire
Total quantity of ER	QTER	'Sentence count' of environmental information	Annual report
Total quality of ER	QLER	Disclosure score (dichotomous score: 1 = disclosed; 0 = not disclose)	Annual report

The following chapter examines the hypotheses set out in the preceding chapter empirically.

CHAPTER FIVE

FINDINGS

5.0 Introduction

The previous chapter discussed the research methods employed in the study. This chapter on the other hand, concerns on reporting the findings of the study. The findings are presented in four main sections. The first section provides an overview of the sample companies. The second section reports the results of preliminary data analyses. These include data cleaning, measuring the validity and reliability of the TEMA scale, as well as descriptive statistics of selected variables. The third section reports the hypotheses testing results. The perceptions of several respondents on the issue of interest, that is, the importance of EMA and its association with ER practices, are reported in the fourth section which aims to provide support for the quantitative analyses. The last section concludes the chapter.

5.1 The Sample

This section reports the response rate to postal questionnaires, characteristics of the responding companies (hereafter "sample companies") and the extent to which these companies perceive the significance of their business environmental impacts.

5.1.1 Postal Questionnaires Response Rate

After four attempts made in sending the questionnaires including follow-ups by telephone calls to non-respondents, only 84 questionnaires were returned. Seven responses came incomplete and thus excluded from the analysis. One company had no annual report for the year ended 2011 as the company was newly listed on the Main

Board during 2012 and had to be excluded. Of the six responses obtained from the pilot test, two were added to those from the actual survey to get the total responses for data analysis. It must be emphasised here that there were no changes made to the questionnaire after the pilot test and the responses were received with a disclosure of the company's name. Most importantly, the corporate annual reports for 2011 of these companies were available. Therefore, a total of 78 usable responses were included for the analysis, representing a response rate of 9.7%.

Although the response rate appears low, given the trend in survey response rate continues to plummet (Dey, 1997; Baruch, 1999), a response rate as low as 9% is expected, especially for a research on emerging issues (Jalaludin et al., 2011) being conducted at the top executive level (Baruch and Holtom, 2008). Similarly, prior postal surveys on related environmental management issues have also elicited a very low response rate ranging from 8% to 14% (e.g. Melnyk et al., 2003; Ferreira et al., 2010; Jalaludin et al., 2011; Christ and Burritt, 2013). Table 5.1 presents the response rate of postal questionnaires.

Table 5.1: Postal Questionnaires Responses

Description	Responses
First mail	28
Second mail (1st reminder)	23
Third mail (2nd reminder)	25
Fourth mail (3rd reminder)	8
Total received	84
Excluded	(8)
Pilot test responses	2
Total final sample	**78**

Accordingly, a content analysis of annual reports of these 78 companies was carried out to measure the quantity and quality of ER.

5.1.2 Characteristics of Sample Companies

Table 5.2 reports the selected characteristics of sample companies. Of the 78 sample companies, 43 (55.1%) are in environmentally less sensitive industries, while 35 (44.9%) in environmentally sensitive industries. The majority of the responses were obtained from those in trading & services (17 companies; 21.8%), properties (13 companies; 16.7%), consumer products and industrial products (12 companies each; 15.4%). These sectors hold among the largest number of companies listed on the Main Market of Bursa Malaysia, which may explain their dominance in the sample. Another possible explanation is that the environmental awareness of these sectors could be more prevalent than the other sectors which may transpire from various forms, especially the regulatory pressures (e.g. environmental standards) as well as the nature of the business itself.

From the ownership status standpoint, GLCs account for only 16.7% (13 companies) of the sample companies. According to the latest information released by the PCG on its website, as at March 2009, only 33 GLCs were listed on the Main Market. Although no recent data is available regarding the number of listed GLCs except the list of G20[32], it can be safely assumed that the number of GLCs listed on the Main market does not fluctuate enormously. Taking into consideration that a large difference in the sample's composition may contribute to the problem of homoscedasticity, where necessary, a test of homogeneity is undertaken to determine whether the variances are homogeneous.

It is intriguing to note that the majority of the sample companies (57 companies; 73.1%) is still not adopting an EMS. Only 12 companies (15.4%) have adopted an EMS of which 11 have it certified (i.e. ISO14001), while one is making progress towards

[32] A selection of 20 GLCs controlled by the Government-Linked Investment Company (GLIC) constituents of the PCG. However, the list comprises only 17 public listed GLCs due to corporate restructuring exercises.

obtaining the accreditation. Of those companies that are adopting an EMS, three companies are in industrial products and trading & services, two companies in technology and one company in construction, consumer products and finance. The remaining five companies (6.4%) affirmed that their company is developing the system. Four respondents, however, did not respond to this question. Given the low EMS adoption rate, it can be concluded that many of the sample companies still do not fully comprehend the intrinsic need for an appropriate system to govern their business environmental impacts. Similar to ownership status, there is also a large discrepancy in the sample's composition with regard to EMS adoption. Nevertheless, the reliability of the questionnaire is not a concern as the Cronbach's α estimates exceeded the criterion of 0.7 (this will be further discussed later in this chapter).

The total assets of the sample companies ranged from RM24.2M to RM249,411M with a mean of RM4,978M (SD = RM249,411). The average proportion of NEDs over the total number of directors was 46.3%, suggesting that the total of NEDs among the sample companies made up almost half of the board members. However, five companies have their NEDs' composition less than the 1/3 threshold as required by the listing requirement.

Despite the low number of companies adopting a voluntary EMS, almost two-thirds of the companies are making effort to manage their environmental issues. When asked about environmental department or personnel to oversee their environmental issues, 6 companies (7.7%) responded that they have an environmental department in place, 35 companies (44.9%) are allocating personnel to address environmental issues and 9 companies (11.5%) are consulting environmental specialists or professionals. Twenty-

eighth companies (35.9%), however, did not embark on any of the abovementioned environmental efforts.

Due to the specific requirement of the ISO14001 standard entailing ISO14001 companies to conduct periodic environmental audit to ensure the maintenance of sound environmental management, all[33] companies that have adopted an EMS conducted EMS audit. On the other hand, less than a third of the sample companies (28.4%) undertook compliance audit. Although companies are not bound to conduct a compliance audit as a matter of course, the audit helps companies to review their compliance status against the legal requirements, enabling them to address the violations without being prosecuted. Thus, considering there are strict regulatory environmental restrictions under the EQA 1974, the percentage of those conducting this audit is rather small. In terms of sector distribution, the number of companies undertook compliance audit were: consumer products (4), industrial products (4), trading & services (4), plantations (2), technology (2), construction (2), properties (2) and finance (1). Four companies, however, did not respond to compliance audit inquiry whereas eight companies on the EMS audit inquiry.

[33] One company which has adopted an EMS however did not respond to the question.

Table 5.2: Characteristics of the Sample Companies

Characteristics	Frequency (%)	Mean (SD)
Industry (IND):		
Environmentally Sensitive:		
Construction	6 (7.7)	–
Properties	13 (16.7)	
Industrial products	12 (15.4)	
Plantations	4 (5.1)	
Less Environmentally Sensitive:		
Consumer products	12 (15.4)	
Trading & services	17 (21.8)	
Real Estate Investment Trusts (REITs)	3 (3.8)	–
Technology	4 (5.1)	
Finance	6 (7.7)	
Close-end funds	1 (1.3)	
Ownership status (OWNER):		
Government-linked company (GLC)	13 (16.7)	–
Non-government-linked company (Non-GLC)	65 (83.3)	
EMS adoption (EMSA):		
Yes	12 (15.4)	
No	57 (73.1)	–
In progress	5 (6.4)	
Missing	4 (5.1)	
Total assets (RM 'million) (SIZE):	–	4,978 (249,411)
Proportion of NEDs (PNED) (in %):		46.3 (12.07)
Proportion of NEDs (PNED) (in group):		
< 1/3 (33.3%)	5 (6.4)	
> 1/3 (33.3%)	73 (93.6)	
Environmental department:		
Have a separate environmental department	6 (7.7)	
There are personnel allocate some time to environmental issues	35 (44.9)	–
Outsourcing	9 (11.5)	
None of the above	28 (35.9)	
Environmental audit:		
Compliance audit:		
Yes	21 (26.9)	–
No	45 (57.7)	
Considering	8 (10.3)	
Missing	4 (5.1)	
EMS audit:		
Yes	11 (14.1)	
No	50 (64.1)	–
Considering	9 (11.5)	
Missing	8 (10.3)	

5.1.3 Perceived Significance of Business Environmental Impacts

The ability of companies to recognise their business environmental impacts can empower environmental accountability, resulting in reactive environmental initiatives to address the impacts. With this in mind, the respondents were asked, on a 5-point scale of 1 (Insignificant) to 5 (Very significant), to indicate the level of significance of the 11 identified environmental issues facing their companies. Given the sample companies are embedded in different nature of business activities which may affect the levels of perception, the responses were segmented into environmental sensitivity industry to provide a more meaningful depiction. Table 5.3 reports the results.

Overall, the sample companies perceived their business activities affect the environment the most through the use of energy (mean = 3.37) and water (mean = 3.05). This seems to be consistent with IFAC's (2005) contention that the consumption of these natural resources is pertinent in every single business activity. At the same time, the use of toxic inputs and soil contamination were perceived as the least significant impacts, with companies in environmentally sensitive industries being slightly concerned on soil contamination, but only at the 10% significance level. Interestingly, no significant different is found between environmentally sensitive and less sensitive industries with regard to the use of toxic inputs. There is also a significant difference in perceived significance of landscape damage between the two groups of industries, but the overall perceived level was rather low. A similar low trend has also been observed for the remaining environmental impacts.

The high consideration on no more than environmental issues of a general nature may suggest that the perceptions are pragmatically driven. More specifically, there is tendency for companies to underemphasise their business environmental impacts other

than those of general issues to conform to perceived norms. It has been previously suggested that the respondent's answer to survey questions may be influenced by what they expect the researcher thinks as a good or correct response (Bloom and Van Reenen, 2007). Thus, it is reasonable to expect such a position in social and environmental survey.

On the other hand, the results may also imply the failure of companies to recognise relevant environmental issues relating to their business activities. This may not be a great concern for companies in environmentally less sensitive industries, but definitely has a questionable value for companies in environmentally sensitive industries. This is mainly because, failing to recognise business environmental impacts may hinder companies to respond adequately to the issues. Thus, it is interesting to investigate the extent to which the sample companies implement EMA.

Table 5.3: Descriptive Statistics for Perceived Business Environmental Impacts by Environmental Sensitivity of Industry

	Mean[ab]			
	Less Sensitive (N=40)	**Sensitive (N=34)**	**Overall Mean**	***t*-test**
Use of water	2.88	3.26	3.05	-1.117
Use of energy	3.21	3.56	3.37	-1.111
Use of non-renewable resources	2.48	2.82	2.64	-0.993
Use of toxic inputs	1.77	2.00	1.88	-0.719
Solid waste	2.08	2.29	2.18	-0.660
Soil contamination	1.70	2.18	1.92	-1.673*
Waste water	2.40	2.32	2.36	0.234
Air emissions	2.28	2.29	2.28	-0.059
Noise pollution	2.10	2.59	2.32	-1.547
Smell pollution	2.10	1.94	2.03	0.529
Landscape damage	1.75	2.41	2.05	-2.238**

Notes: *, **. Significant at the 10% and 5% level, respectively.
[a]. The Likert scale ranged from 1 (Insignificant) to 5 (Very Significant).
[b]. Based on a sample size of 74 (four respondents did not respond).

5.2 Results of Preliminary Data Analyses

Prior to testing the hypotheses, independent and dependent variables were screened for errors and missing data. In addition, the TEMA scale and disclosure scores were subjected to validity and reliability tests to minimise any potential biases that are associated with the measurement of the constructs. The descriptive statistics of variables are also reported in this section.

5.2.1 Data Cleaning

Using the FREQUENCIES (for categorical data) and DESCRIPTIVES (for continuous data) option in the SPSS, each variable was screened for errors and missing values. Through the analyses, a small number of wrongly coded data were identified and corrected afterwards. Four missing values were observed in variable EMSA. However, no imputation was carried out as this variable is a categorical variable.

As predicted, there were a considerable amount of N/A responses in the TEMA scale. There, however, were no skipped responses. It must be emphasised here that N/A responses in the present study were treated as missing values (*missing-by-design*) and thus, excluded from the mean calculation. The results in Table 5.4 show that all items in the scale had at least one N/A response. In terms of individual case, 35 companies (44.9%) had no N/A responses, while the remaining 43 companies (55.1%) had marked N/A on at least one item. Among the 29 items comprising the TEMA scale, six items, namely, STA7, STA9, STA11, ECA2, ECA3 and ECA8; have more than 30% of N/A responses. However, because the amount did not exceed the selected 50% threshold of missing values, all items were retained.

Table 5.4: Items Eliciting At Least One N/A Response (N=78)

	Items	Missing	
		N	%
INC1	The costing system	12	15.4
INC2	The budgeting system	13	16.7
INC3	Capital budgeting and expenditure	13	16.7
INC4	Investment appraisal	12	15.4
INC5	Performance measurement and appraisal	14	17.9
INC6	Internal reporting mechanisms	14	17.9
INC7	Risk assessment	11	14.1
INC8	Purchasing policy	12	15.4
INC9	Plant maintenance	21	26.9
STA1	Waste, emissions and effluents	21	26.9
STA2	Raw materials usage	22	28.2
STA3	Energy usage	15	19.2
STA4	Recycled materials usage	17	21.8
STA5	Returnable packaging/containers	23	29.5
STA6	Pollution (i.e. air, water, land)	20	25.6
STA7	Land remediation/Accounting for rehabilitation	25	**32.1**
STA8	Environmental contingent liabilities	19	24.4
STA9	Life cycle cost analysis (LCA) in product development	25	**32.1**
STA10	Compliance costs of environmental regulations	19	24.4
STA11	Environmental costs in production costs	24	**30.8**
ECA1	Energy efficiency	18	23.1
ECA2	By product use	28	**35.9**
ECA3	Recyclable containers/packaging	26	**33.3**
ECA4	Waste management	20	25.6
ECA5	Pollution minimization/prevention	20	25.6
ECA6	Environmental contingent liabilities	21	26.9
ECA7	Environmental compliance	19	24.4
ECA8	Site contamination	24	**30.8**
ECA9	Site clean-up	22	28.2

Because *missing-by-design* can be MAR (Schafer, 1997), it is of importance to determine the pattern of missingness to minimise any potential biases in the results. In the present study, a N/A option was deliberately offered to address the intra-industry variations and for that reason, it is reasonable to expect that N/A responses are subjected to environmental sensitivity of industry (IND). To ensure that this assumption holds, the present study decided to expand the analysis across other observed variables by adding company size (SIZE), ownership status (OWNER), EMS adoption (EMSA) and the proportion of NEDs (PNED). To do so, a Spearman's rank order correlation was

performed. Spearman's rank order correlation is a non-parametric alternative to Pearson's correlation.

Results in Table 5.5 indicate that there is a negative and significant association between N/A responses and IND (r = -0.306; p < 0.01), as expected. The negative correlation coefficient suggests that there is an overwhelming tendency for companies in environmentally less sensitive industries to endorse N/A responses. No significant associations between N/A responses and the remaining corporate characteristics were found. As an additional analysis, a Little's MCAR test was performed. The result shows insignificant p-value ($\chi^2(641) = 635.939$; $p = 0.549$). Based on both results, it can be concluded that N/A responses in the present study were not MNAR. Therefore, no specific model is necessary to address the issue and that the interpretation of the parameter estimates of composite variables can be made accordingly.

Table 5.5: Correlations between Frequency of N/A Responses and Corporate Characteristics (N=78)

Corporate Characteristics	N/A Responses
IND	-0.306**
	(0.006)
SIZE	0.116
	(0.311)
OWNER	0.026
	(0.818)
EMSA[a]	-0.088
	(0.455)
PNED	-0.024
	(0.836)

Notes: *Dummy variables:* IND (Sensitive=1; Less-sensitive=0); OWNER (GLC=1; Non-GLC=0); EMSA (Adopted EMS=1; Not adopted EMS=0).
p-values are shown in parentheses.
**. Correlation is significant at the 1% level (two-tailed).
[a]. N = 74 due to missing values.

As far as hypotheses testing are concerned, there were no missing data observed in other variables.

5.2.2 Measuring the Validity and Reliability of the TEMA Scale

The validity and reliability of TEMA scale were measured using principle components analysis (PCA) and Cronbach's alpha (α), respectively.

5.2.2.1 Principle Components Analysis (PCA)

A PCA with varimax rotation was performed on the 29 items in the TEMA scale to assess the scale validity. Prior to performing the PCA test, several preliminary analyses were conducted to determine the adequacy of data for PCA. Only 35 complete cases were included in the analysis of which below the minimum threshold of 50 as proposed by Hair et al. (2010). To compensate for this small sample size, the factor loadings of above 0.6 for at least four items in the factor is therefore necessary for the results to be reliable (Preacher and MacCallum, 2002; Field, 2009). The inter-correlations between most of the items were above the threshold of 0.3 (see Appendix F), suggesting that the inter-correlations of assumption has been met (Tabachnick and Fidell, 2007; Field, 2009; Hair et al., 2010). Moreover, none of the items were highly correlated ($r > 0.9$), therefore, multicollinearity is not a concern. In addition, the Kaiser–Meyer–Olkin (KMO) measure verified the sampling adequacy for the analysis, $KMO = 0.503$ (> 0.5) (Field, 2009; Hair et al., 2010) and the Bartlett's test showed significant p-value, $\chi^2(406) = 1248.366$, $p = 0.000$, indicating good data adequacy for PCA (Field, 2009; Hair et al., 2010).

An initial PCA yielded 6 components with eigenvalues > 1. The scree plot revealed a break around the 3rd and 6th components (see Appendix G). Given the small sample size

and that to be in correspondence with the initial subscales in the questionnaire, a three-factor model appeared to be the best fit to the data. The PCA was rerun with all items were forced onto 3 components and the cumulative variance explained by the 3 components was 66.59%. The percentage of variance explained by each component was as follows: component 1 explained 37.49% (eigenvalue = 10.871), component 2 explained 19.52% (eigenvalue = 5.660) and component 3 explained 9.59% (eigenvalue = 2.781) (see Appendix H). Items with factor loadings more than 0.4 and the difference of at least 0.1 in factor loadings between factors (cross-loadings) were retained. Based on these two criteria, four items: INC9, STA11, ECA3 and ECA9; were eliminated. Two items: ECA1 and ECA2; did not load on the expected factor and thus were eliminated.

The PCA was repeated with 23 TEMA items. Table 5.6 summarises the results. The *KMO* measure of 0.695 (> 0.50) and the Bartlett's test of χ^2 (253) = 975.278, p = 0.000. The three components with eigenvalues > 1 explained 70.25% of the variance. The percentage of variance explained by each component was as follows: component 1 explained, component 2 explained. The first factor explained 36.59% (eigenvalue = 8.416) of the variance and the second and third factors, an additional 22.04% (eigenvalue = 5.068) and 11.62% (eigenvalue = 2.672), respectively. More importantly, the factor loadings for most items were above 0.6, suggesting that the factor solutions were justifiable for a small sample size (Preacher and MacCallum, 2002; Field, 2009). None of the items were cross loaded (<0.1), thus, all 23 items were retained. The three components were as follows:

- ***Component 1 – Stand-alone environmental accounting (STA):*** STA1, STA2, STA3, STA4, STA5, STA6, STA7, STA8, STA9 and STA10.

- ***Component 2 – Inclusion of environmental information in MASs (INC):*** INC1, INC2, INC3, INC4, INC5, INC6, INC7 and INC8.
- ***Component 3 – Environmental cost-benefit analysis (ECA):*** ECA4, ECA5, ECA6, ECA7 and ECA8.

Table 5.6: PCA (Rotated Component Matrix) for the TEMA Scale

Items		Factor Loadings*		
		1	2	3
Costing system	INC1		**0.848**	
Budgeting system	INC2		**0.874**	
Capital budgeting and expenditure	INC3		**0.875**	
Investment appraisal	INC4		**0.782**	
Performance measurement	INC5		**0.689**	
Internal reporting	INC6		**0.717**	
Risk assessment	INC7		**0.735**	
Purchasing policy	INC8		**0.798**	
Waste, emissions and effluents	STA1	**0.877**		
Raw materials usage	STA2	**0.709**		
Energy usage	STA3	**0.598**	0.401	
Recycled material usage	STA4	**0.767**		
Returnable packaging	STA5	**0.736**		
Pollution	STA6	**0.793**		
Land remediation/Accounting for rehabilitation	STA7	**0.691**		
Environmental contingent liabilities	STA8	**0.705**		0.426
Life cycle cost analysis in product development	STA9	**0.706**		
Compliance costs of environmental regulations	STA10	**0.637**		0.418
Waste management	ECA4			**0.744**
Pollution minimization	ECA5			**0.875**
Environmental contingent liabilities	ECA6			**0.889**
Environmental compliance	ECA7			**0.863**
Site contamination	ECA8			**0.884**
Eigenvalue		8.416	5.068	2.672
Percentage of variance explained		36.59	22.04	11.62

Notes: *. Absolute values less than 0.4 were suppressed.
N = 41 (after the deletion of 6 items)

5.2.2.2 Cronbach's Alpha (α)

After the PCA test, the internal consistency reliabilities of the subscales were next assessed. The results of Cronbach's alpha (α) test as shown in Table 5.7 demonstrate high reliability of internal consistency, above the common threshold of 0.7 (Nunnally,

1978; Malhotra, 2010; Pallant, 2011). All the components scored a Cronbach's α value of greater than 0.9 and deletion of items would not increase α significantly for any of the subscales.

Table 5.7: Internal Consistency Reliability Statistics for the TEMA Subscales

Subscale	No. of items	Cronbach's alpha (α)
INC	8	0.936
STA	10	0.930
ECA	5	0.953

As can be seen in Table 5.8, all three subscales are positively associated with TEMA ($r > 0.6$, $p < 0.01$), providing further support for the criterion validity of the scale. According to Cohen (1988), $r > 0.5$ indicates strong association between variables. The inter-correlations between INC and ECA ($r = 0.273$, $p < 0.05$) and STA and ECA ($r = 0.603$, $p < 0.01$) are also significant. However, there is no significant association between INC and STA subscales.

Table 5.8: Correlation Matrix of TEMA and Its Subscales

	TEMA	INC	STA	ECA
TEMA	1.000			
INC	0.642**	1.000		
	(0.000)			
STA	0.821**	0.168	1.000	
	(0.000)	(0.199)		
ECA	0.770**	0.273*	0.603**	1.000
	(0.000)	(0.038)	(0.000)	

Notes: *p*-values are shown in parentheses.
*, **. Correlation is significant at the 5% and 1% level (two-tailed), respectively.

5.2.3 Measuring the Reliability of Content Analysis of Annual Reports

In agreement with Krippendorff's (2004) suggestion, a *test-retest* analysis was performed to determine the reliability of the disclosure scores derived from a single coder. To accomplish this, 20 corporate annual reports of the sample companies were randomly selected and measured for the second time, two months after the first round in particular. Because the disclosure scores were not normally distributed and that the sample was less than 30, a Spearman's rank order correlation test was performed to test the association between first and second round's coding scores.

The results in Table 5.9 suggest that the scores for QTER and QLER in first and second round are significantly and positively correlated. The high correlations indicate that the coding consistency of a single coder over time is maintained (Milne and Adler, 1999). Apart from the *test-retest*, other precautionary measures, for example, content validity with accounting professors and a professional including the pilot content analysis of corporate annual reports had been taken into account. Thus, it is expected that all of these measures were reasonably adequate to address the reliability issue, be it for a single coder or the instrument (i.e. coding index) itself.

Table 5.9: Correlations between First and Second Round Scoring

		QTER	**QLER**
Disclosure Scores		Second round	Second round
QTER	First round	0.996** (0.000)	---
QLER	First round	---	0.979** (0.000)

Notes: *p*-values are shown in parentheses.
**. Correlation is significant at the 1% level (two-tailed).

5.2.4 Descriptive Statistics of Variables

In this section, the results of descriptive statistics for the variables selected for hypotheses testing are presented.

5.2.4.1 The Extent of EMA Implementation

Before categorising the companies into social issue life cycle phases, it is worthwhile to report that nine companies (11.5%) indicated that all items in the TEMA scale were not applicable to their businesses. Of these companies, seven were involved in environmentally less sensitive industries: finance (3), trading & services (2), consumer products (1), REITs (1) and technology (1)); and one in environmentally sensitive industry: industrial products (1). Although some of the items are industry-related of which N/A responses from certain industries are likely, the administration of wastes, energy and water consumption or emissions, however, is relevant to all industries (IFAC, 2005). Responding N/A to all items in the scale, to a certain extent, indicates that these companies show lack of interest or awareness on the environment.

The distribution of the responses of the TEMA scale is first summarised in Table 5.10. The responses are grouped into three categories: i) Never, ii) Sometimes: Rarely and Sometimes; and iii) Often: Often and Very Often; for a more meaningful depiction. The means and standard deviations (SDs) of the related items are also reported. Overall, the mean score for TEMA (mean = 3.11) shows a moderate extent of EMA implementation. In addition, companies seem to place a slightly higher emphasis on environmental cost-benefit analysis (ECA) subscale (mean = 3.28) compared to the integration of environmental information within existing MASs (INC) (mean = 3.15) and the stand-alone environmental accounting procedures (STA) (mean = 3.06) subscales. A smaller percentage of companies marked N/A on items related to INC subscale, indicating that

the majority of companies are aware of the prospect of integrating environmental information into business decision makings. However, given the moderate level of implementation (mean = 3.15), environmental information has yet to become a salient part of business decision makings. Such a position seems to be reinforced by similar emphasis placed by the companies on STA subscale (mean = 3.06).

Of the EMA items surveyed, accounting for energy usage (STA3) (mean = 3.59) and cost-benefit analysis to environmental compliance (ECA7) (mean = 3.58) are the most frequent use items in the sample companies. In today's business environment which embodies the consumption of energy in almost if not all activities, directly or indirectly, accounting for energy usage allows companies to improve energy efficiency which may result in cost savings (Frost and Wilmshurst, 2000). In addition, nearly half of the sample companies are in manufacturing industries (e.g. industrial products, consumer products, computer technology, utilities and transportation – trade/services) of which these industries are among the most energy-intensive users (Abdelaziz et al., 2011). This thus may explain why there is a high consideration on energy usage among the sample companies.

The high implementation of cost-benefit analysis to environmental compliance (ECA7) seems to confirm a previous finding that companies are more likely to comply with the regulations in an attempt to safeguard the continued existence of their business (Bartolomeo et al., 2000; Jalaludin et al., 2011). In a regulated business environment, non-compliance may result in litigation and negative publicity, which can adversely affect corporate profitability. Oftentimes, non-compliance costs are significant, even can be more costly than compliance costs (Epstein, 2008). For example, under the EQA 1974, depending on the level of non-compliance, the penalties could be a fine

(maximum from RM10,000 to RM500,000) or imprisonment (from two to five years), or a combination thereof (Mustafa, 2011). In addition, regaining public trust requires companies to be reactive to unforeseen event (Suchman, 1995; O'Donovan, 2002) and perhaps as transparent as possible as they are under the public spotlight. Failure to do so may pose a significant threat to companies' continued existence. Such a commitment to comply with regulations is reflected in the findings that similar emphasis was placed on compliance-related items, namely, accounting for environmental compliance costs (STA10) (mean = 3.29), pollution (STA6) (mean = 3.22) and waste, emissions and effluents (mean = 3.21); and cost-benefit analysis to waste management (ECA4) (mean = 3.24), pollution minimisation (ECA5) (mean = 3.38) and site contamination (ECA8) (mean = 3.28).

On the other hand, the use of accounting for land remediation (STA7) (mean = 2.47), life cycle cost analysis in product development (STA9) (mean = 2.53) and environmental contingent liabilities (STA8) (mean = 2.69) were less common in the companies. The low emphasis on accounting for land remediation can be attributed to lack of legislation on land remediation. To date, there is no specific legislation under the EQA 1974 requiring companies to carry out land remediation, although, some companies would conduct the analysis voluntarily to fulfil property lease or purchasing requirements (Yin et al., 2006). The low environmental uncertainty which Malaysian companies are currently facing with regards to environmental activities (Jalaludin et al., 2011) may explain why companies on average placed a low emphasis on accounting for environmental contingent liabilities. Uncertainty can be described as lack of information or knowledge in decision making (Duncan, 1972) and such a situation usually relates to competitors, government regulations, changing technology and customers' demands (Hoque, 2004; Wang et al., 2012). In low environmental uncertainty, the decision

making process is less complicated as the company has sufficient information or knowledge on the related issue. The results also show that companies placed similar emphasis on cost-benefit to environmental contingent liabilities (ECA6) (mean = 2.98). Finally, the low emphasis on life cycle cost analysis in product development suggests that companies on average placed little importance on measuring environmental information in their product development.

Table 5.10: Descriptive Statistics of TEMA Scale

	Items	N	Frequency – Grouping			N/A	Mean	SD
			Never	Sometimes	Often			
Overall (TEMA)		**61**					**3.11**	**0.716**
Inclusion of environmental information in MASs (INC):		**66**					**3.15**	**0.875**
INC1	The costing system	66	7 (10.6)	33 (50.0)	26 (39.4)	12	3.03	1.163
INC2	The budgeting system	65	7 (10.8)	33 (50.8)	25 (38.4)	13	3.14	1.130
INC3	Capital budgeting and expenditure	65	5 (7.7)	32 (49.2)	28 (43.1)	13	3.20	1.078
INC4	Investment appraisal	66	3 (4.5)	38 (57.6)	25 (37.9)	12	3.17	1.017
INC5	Performance measurement and appraisal	64	5 (7.8)	41 (64.1)	18 (28.1)	14	2.97	1.007
INC6	Internal reporting mechanisms	64	7 (10.9)	39 (60.9)	18 (28.1)	14	2.92	1.059
INC7	Risk assessment	67	2 (2.9)	36 (53.7)	29 (43.3)	11	3.34	0.946
INC8	Purchasing policy	66	3 (4.5)	33 (50.0)	30 (45.5)	12	3.36	0.971
Stand-alone environmental accounting procedures (STA):		**60**					**3.06**	**0.959**
STA1	Waste, emissions and effluents	57	7 (12.3)	23 (40.4)	27 (47.3)	21	3.21	1.264
STA2	Raw materials usage	56	5 (8.9)	23 (41.1)	28 (50.0)	22	3.48	1.221
STA3	Energy usage	63	2 (3.2)	28 (44.4)	33 (52.4)	15	3.59	1.072
STA4	Recycled materials usage	61	7 (11.5)	33 (54.1)	21 (34.4)	17	3.05	1.161
STA5	Returnable packaging/containers	55	7 (12.7)	30 (54.5)	18 (32.7)	23	3.02	1.225
STA6	Pollution (i.e. air, water, land)	58	7 (12.1)	24 (41.4)	27 (46.5)	20	3.22	1.298
STA7	Land remediation/Accounting for rehabilitation	53	14 (26.4)	29 (54.7)	10 (18.9)	25	2.47	1.187
STA8	Environmental contingent liabilities	59	10 (16.9)	38 (64.4)	11 (14.1)	19	2.69	1.163
STA9	Life cycle cost analysis in product development	53	10 (18.9)	39 (73.6)	4 (7.6)	25	2.53	0.932
STA10	Compliance costs of environmental regulations	59	5 (8.4)	29 (49.1)	25 (42.3)	19	3.29	1.190

Note: Percentages are shown in parentheses (calculated based on the number of valid responses – excluding N/A). Each item was scored on a 5-point Likert-scale, ranging from 1 (Never) to 5 (Very Often). N/A responses were excluded from the calculation of mean and SD.

Table 5.10: Descriptive Statistics of TEMA Scale

	Items	N	Frequency – Grouping			N/A	Mean	SD
			Never	Sometimes	Often			
Environmental cost-benefit analysis (ECA):		**59**					**3.28**	**1.048**
ECA4	Waste management	54	2 (3.7)	32 (59.3)	24 (44.4)	20	3.24	1.081
ECA5	Pollution minimization/prevention	58	3 (5.1)	26 (44.8)	29 (50.0)	20	3.38	1.105
ECA6	Environmental contingent liabilities	57	7 (12.3)	31 (54.4)	19 (33.3)	21	2.98	1.203
ECA7	Environmental compliance	59	4 (6.8)	21 (35.6)	34 (57.6)	19	3.58	1.192
ECA8	Site contamination	54	5 (9.3)	24 (44.5)	25 (46.3)	24	3.28	1.204

Note: Percentages are shown in parentheses (calculated based on the number of valid responses – excluding N/A). Each item was scored on a 5-point Likert-scale, ranging from 1 (Never) to 5 (Very Often). N/A responses were excluded from the calculation of mean and SD.

Accordingly, using the TEMA score, companies were grouped into Policy, Learning and Commitment phases. For this categorisation purposes, although no TEMA score was computed for companies that marked N/A responses on all items or more than 50% of items in the scale, these companies were equally assessed. More specifically, those nine companies with all N/A responses were automatically grouped into the Policy phase. The basic premise for this decision is that environmental issues are indeed relevant in all types of business industries (IFAC, 2005). Therefore, the absence of commitment on general environmental issues, such as, energy consumption and waste minimisation which is echoed by N/A responses, is an indication that there is no urgency for these companies to address environmental issues, reflecting the Policy phase (Nasi et al., 1997). Meanwhile, there were six companies with one subscale score (no TEMA score was calculated for these companies) of which five with a subscale score greater than 3.6 and one with a score of 2.75. The latter was grouped into Policy. This is due to two reasons: one, half of the items in the scale was marked N/A, and two, the execution of partial EMA on 'Rarely' and 'Sometimes' basis reflects the abovementioned characteristics of the Policy phase. On the other hand, the remaining five companies with a TEMA score greater than 3.6 were grouped into Learning. Although the execution of items in the subscale is of relatively frequent, half of the items in the scale was marked N/A. Therefore, it is deemed appropriate to include them in the Learning phase, reflecting that they are 'learning' to address their environmental issues and that the awareness is accelerating. The remaining 61 companies were grouped into the Policy, Learning and Commitment phases based on the following cut-off points:

POLICY = if TEMA score ≤ 2.00
LEARNING = if TEMA score ranging from 2.01 to 3.59
COMMITMENT = if TEMA score ≥ 3.60

As shown in Table 5.11, the results of this consideration indicate that the majority of companies (62.8%) are in the Learning phase, reflecting the earlier finding that the extent of EMA implementation is moderate. In the subsequent analysis, these social issue life cycle phases are used to represent the extent of EMA implementation (Policy = low; Learning = moderate; and Commitment = high extent).

Table 5.11: Group Distribution Based on Social Issue Life Cycle Phases

Phase	N	%
Policy	16	20.5
Learning	49	62.8
Commitment	13	16.7
Total	**78**	**100.0**

5.2.4.2 The Quantity of ER

QTER was measured in terms of the amount of sentences reported. In particular, an environmental disclosure checklist was used to determine whether the sentence pertains to environmental information. Altogether, 78 annual reports of the sample companies were assessed. As shown in Table 5.12, 67 companies (85.9%) reported at least one sentence of environmental information in their annual reports. The minimum number of environmental sentences reported by a single company was one, while the maximum was 231 sentences (mean = 17.96). Eleven companies (14.1%) of which three each in properties, REITs and trading & services, and one in finance and close end funds, however, did not report any environmental information in their annual report. A further inspection on the questionnaire responses shows that 10 of these companies indicated that they do not engage in ER while one company is considering embarking on such practice.

Table 5.12: Descriptive Statistics of QTER

Description	N	%	Total number of sentence			
			Min	Max	Mean	SD
Reporting companies	67	85.9	1	231	17.96	32.227
Non-reporting companies	11	14.1	–	–	–	–
Total	**78**	**100**				

In addition, a cross-tabulation between reporting and non-reporting companies with TEMA responses shows that 8 out of the 11 non-reporting companies had executed at least one EMA item, with one of them even among the highest TEMA scorers. Meanwhile, six of the reporting companies did not implement any of the EMA items. As expected, five of these companies did not make any disclosure on quantified environmental information, while one company reported some information regarding environmental performance on energy usage, water and raw material use and wastes. The company, as well as other 14 reporting companies indicated in the questionnaire that they have a specific department responsible for preparing environmental information for reporting purposes, further explaining why such disclosure was being made. The specific department includes Safety and Health Department, Corporate Social Responsibility Department, Quality, Health, Safety and Environment (QHSE) Department and Corporate Communication Department. Additionally, 7 out of the 15 companies stated that their Accounting or Finance Department is involved in the preparation of ER. The remaining companies, however, did not respond to the question.

5.2.4.3 The Quality of ER

QLER was measured using a constructed environmental disclosure index. The measurement of QLER provides an indication on the comprehensiveness and reliability of the reporting. A total score of 100 was awarded if all items within the index were disclosed. In order not to penalise companies for not reporting any items that are not

applicable to the companies, a relative score was calculated instead, by excluding non-applicable items in the calculation of total quality of reporting score. Table 5.13 reports the descriptive statistics of QLER.

The adjusted mean score for QLER was 6.68 with the minimum relative score awarded for a single company was 1.02 and the maximum score was 42.86. With the maximum score not even surpassed half of the total score, the quality of the sample companies' ER appears to be far less comprehensive. This is echoed by the fact that none of the companies reported any information concerning stakeholders' engagement, executive compensation linking to environmental performance, external assurance, adoption of GRI or any reporting guidelines and the communication and feedback mechanism.

A majority of the sample companies (N = 45) managed to report their environmental policy or code of conduct. It is however observed that most of the companies reported their pledge on environmental considerations in a broad term. For example, some selected companies reported,

> [The company] is committed to making continuous improvements in the management of our environmental impact and to the longer-term goal of developing a sustainable business (**ID14**).
>
> Environmental-friendly approaches to sustainable plantations management had always been a part of our policy and practices (**ID19**).
>
> Environmental, ethical and social responsibility issues and standards are also taken into consideration in every aspect of our business (**ID25**).
>
> We take our environment responsibilities seriously, and it is our policy that environmental considerations and ecological changes should be an integral part of our day-to-day activities (**ID66**).

In spite of the general declaration of the company's environmental policy or code of conduct, one company (**ID33**), however, reported its specific environmental policy, that is, Timber Environmental Policy and Timber Sourcing Policy.

The management's support on being environmentally responsible plays a substantial role in determining the intensity of a company's environmental commitment (Zutshi et al., 2008). At best, any mentioned about the company's environmental commitment in the Chairman's Letter to shareholders is expected as an attempt to provide an indication of the importance of managing environmental issues to the company. In relation to this, about 46% of the companies (31 companies) broadly discussed their environmental considerations in the chairman's letter to shareholders.

It is rather intriguing that 19 companies reported at least one statement regarding their material business environmental impacts. On one hand, this may seem contrary to legitimacy assumption where companies are more likely to avoid reporting negative information that may jeopardise the corporate image. On the other hand, acknowledging any potential environmental impacts of business activities to some extent, suggests a commitment of the company in engaging environmentally responsible. In particular, one company reported that,

> As a property developer, we have an impact on the environment throughout the property life cycle: -the time of land acquisition, the design of the development, including the selection of fittings and material specs, the actual construction processes and finally the operational performance of the building over its life span. As a responsible developer, we will do our best within business constraints and in areas we have control over, to minimise the adverse effects on the environment to reduce our footprint (**ID41**).

Also, another company disclosed the following:

> The Group, being involved in the logistics industry, primarily uses a large fleet of trucks and prime movers to carry out its business activities. The trucks and prime movers have regularly scheduled essential maintenance works carried out on them to ensure that they are roadworthy and comply with the Department of Environment regulations for emissions (**ID36**).

In terms of companies' environmental initiatives, managing waste management was the most information reported, followed by energy consumption. This is congruent with

IFAC's (2005) and Frost and Wilmshurst's (2000) contention that the environmental impacts of a general nature like waste and energy which are common to all types of business sectors is somewhat expected.

In accordance with legitimacy theory that suggests companies tend to publicise their green activities in an attempt to shape positive public perception towards the company, a number of companies participated in various voluntary environmental programs, whether it be with the community (n = 28), regulatory bodies (n = 11) or non-governmental organisations (n = 17).

With respect to environmental governance structures, 18 companies reported at least a statement regarding their EMS implementation. Among the related EMSs implemented are ISO 14001, Roundtable Sustainable Palm Oil (RSPO), Environmental Management Plan and Sustainable Forest Management. Only three companies have their environmental committee on the board. Six companies reported that they set out periodic environmental audit. Meanwhile, eight companies endorsed environmental terms and conditions to their suppliers/customers. In this regard, some of these companies reported,

> The Company engages the services of equipment suppliers to regularly monitor the calibration of the equipment to avoid application errors (under and over applications) and safety to the operators. Regular training and refresher courses are implemented, all of which are audited by accredited auditors of the RSPO every year (**ID16**).
>
> The supplier-buyer relationship is regularly reviewed and improved upon to comply with international standards. Our newsprint suppliers are sourced from sustainable managed forests and from environmentally responsible mills (**ID41**).
>
> Many of our social and environmental impacts are derived from activities in our supply chain. Controlling whom we buy the products from, our method of purchase and what we buy is an important part of our strategy to reduce negative environmental and social impact (**ID73**).

A maximum of 10 companies reported environmental information concerning the environmental performance index (EPI). Direct energy consumption, recycled material and greenhouse emissions were the most prevalent information reported by companies. Some of these companies even reported the current data, absolute data (in kg or joule) and trend over time analysis in their environmental report. The identification of the significance of energy consumption as observed earlier in this study which is echoed in the almost frequent execution of accounting for energy consumption seems to equate to actual disclosure within the corporate annual report. However, further investigation is needed to confirm the association between EMA implementation and ER practices.

While more than a few of companies managed to report their EPI data, monetary environmental information is far lacking. Only four companies reported such information with one of them mentioned that they practiced environmental full costing. As a matter of fact, the results from the questionnaire survey revealed that these companies have their Accounting Department involved in the preparation of ER. Nonetheless, the disclosure of monetary environmental information was largely on the amount spent on R&D and summary of savings arising from environmental initiatives. One of these companies reported the purchase of biological assets in the financial statement.

In terms of report scope and design, only 29 companies dedicated a specific section for their environmental disclosure of which incorporated into the CSR section. This perhaps is due to the requirement of the CSRR by Bursa Malaysia which requires PLCs to disclose their CSR activities in the annual reports. Finally, while most of the reporting companies reported environmental information associated with the holding company in

general, 14 companies included further information on their subsidiaries' and/or branches' environmental information.

Table 5.13: Descriptive Statistics of QLER

Report Characteristics	N (%)*	Disclosure score		
		Mean	Min	Max
(1) Corporate environmental commitment and strategy				
1. Chairman/CEO statement on environmental commitment/performance in the letter to shareholders	31 (46.3)	0.463	0	1
2. Corporate environmental vision/mission	10 (14.9)	0.149	0	1
3. Corporate environmental policy, values and principles, and/or environmental codes of conduct	45 (67.2)	0.672	0	1
4. Identification of significant environmental impacts of company's business activities on the environment	19 (28.4)	0.284	0	1
(2) Environmental initiatives and achievements				
1. Environmental initiatives to mitigate material environmental impacts of company's products and services in relation to:				
i. Materials use	13 (19.4)	0.194	0	1
ii. Energy consumption	18 (26.9)	0.269	0	1
iii. Water use	9 (13.4)	0.134	0	1
iv. Emissions				
▪ Greenhouse gas emissions	14 (20.9)	0.209	0	1
▪ Other air emissions	3 (4.5)	0.045	0	1
v. Waste	24 (35.8)	0.358	0	1
vi. Biodiversity	9 (13.4)	0.134	0	1
vii. Noise, visual, odour and radiation	4 (5.9)	0.059	0	1
2. Specific environmental innovations and/or new green technologies adopted	18 (26.9)	0.269	0	1
3. Corporate-community involvement (e.g. green/environmental community project) or donations related to environment	28 (41.8)	0.418	0	1
4. Participation in voluntary environmental initiatives endorsed by the government statutory bodies (e.g. Department of Environment)	11 (16.4)	0.164	0	1
5. Participation in other environmental organisations and/or association (e.g. industry membership) to improve environmental practices	17 (25.4)	0.254	0	1
6. Awards won and/or certifications (e.g. product certification) received related to corporate environmental initiatives	12 (17.9)	0.179	0	1

Note: *. Percentage (shown in parenthesis) calculated is based on the total reporting companies = 67

Table 5.13, *continued.*

Report Characteristics	N (%)*	Disclosure score		
		Mean	Min	Max
(3) Environmental governance structure				
1. There is a department and/or individuals responsible for day to day implementation of environmental strategy and policy	4 (5.9)	0.059	0	1
2. There is an environmental committee in the board	3 (4.5)	0.045	0	1
3. Executive compensation is linked to environmental performance	0 (0)	0	0	0
4. The implementation of an environmental management system (EMS) (e.g. ISO14001; RSPO) at the plant and/or firm level	18 (26.9)	0.269	0	1
5. There are formal corporate procedures on environmental contingency planning and environmental risk assessment	4 (5.9)	0.059	0	1
6. The implementation of internal/periodic environmental assurance/audit	6 (8.9)	0.089	0	1
7. Employee training program in environmental management and operations	4 (5.9)	0.059	0	1
8. Terms and conditions applicable to suppliers and/or customers about corporate environmental practices	8 (11.9)	0.119	0	1
(4) Environmental compliance				
1. Compliance with environmental statutory requirements and/or standards	15 (22.4)	0.224	0	1
2. Prosecutions and complaints received related to environment	0 (0)	0	0	0
3. Total amount of fines paid related to non-compliance	0 (0)	0	0	0
(5) Environmental performance indicators (EPI)*				
1. Materials:				
i. Material use	6 (8.9)	0.027 þ	0	3
ii. Recycled material	9 (13.4)	0.039	0	3
2. Energy:				
i. Direct energy consumption	10 (14.9)	0.057	0	3
ii. Indirect energy consumption	3 (4.5)	0.009	0	1
iii. Energy Saving	4 (5.9)	0.018	0	3

Notes: *. Percentage (shown in parenthesis) calculated is based on the total reporting companies = 67

þ. Total disclosure score/Total allocated score (i.e. No. of reporting companies × 5); Maximum score = 5

Table 5.13, *continued*.

Report Characteristics	N (%)*	Disclosure score		
		Mean	Min	Max
3. Water use:				
i. Water withdrawal	7 (10.4)	0.027 ᵇ	0	3
ii. Water recycled or reused	2 (2.9)	0.006	0	1
4. Emissions:				
i. Greenhouse gas emissions	9 (13.4)	0.042	0	3
ii. Other air emissions - NO, SO, and other significant air emissions	3 (4.5)	0.018	0	3
5. Effluents and Waste				
i. Water discharge	3 (4.5)	0.009	0	1
ii. Waste	8 (11.9)	0.033	0	3
6. Biodiversity (land, resources use, conservation)	7 (10.4)	0.051	0	4
(6) Environmental financial data				
1. Amount spent on technologies, research and development (R&D) and/or innovations to enhance corporate environmental performance and/or efficiency	4 (5.9)	0.059	0	1
2. Summary of savings (in RM) arising from environmental initiatives to the company	4 (5.9)	0.059	0	1
3. The integration of environmental information within conventional financial statement (e.g. environmental investments and purpose of investments; contingent liabilities)	3 (4.5)	0.045	0	1
4. Practice environmental full costing	1 (1.5)	0.015	0	1
(7) Stakeholder engagement				
1. Basis of identification and selection of major stakeholders	0 (0)	0	0	0
2. Stakeholder involvement in setting corporate environmental policies	0 (0)	0	0	0
3. Stakeholder involvement in the environmental disclosure process	0 (0)	0	0	0
(8) Report scope and design				
1. Separate environmental section is dedicated in the annual report	29 (43.3)	0.433	0	1
2. Adoption of GRI Guidelines or other reporting guidelines	0 (0)	0	0	0
3. Boundary of report	14 (20.8)	0.208	0	1

Notes: *. Percentage (shown in parenthesis) calculated is based on the total reporting companies = 67

ᵇ. Total disclosure score/Total allocated score (i.e. No. of reporting companies × 5); Maximum score = 5

Table 5.13, *continued.*

Report Characteristics	N (%)	Disclosure score		
		Mean	Min	Max
4. External assurance/verification about environmental information disclosed	0 (0)	0	0	0
5. Communication and feedback mechanism:	0 (0)	0	0	0
▪ name of the person or department responsible with preparing the reports and contact details				
Total disclosure score			**1**	**42**
Adjusted total disclosure[**]			**1.02**	**42.85**
Adjusted overall mean		**6.68**		
(SD)		**(8.194)**		

Note: [**]. Scores after adjusting the actual items that should be reported (i.e. relative scores)

Prior findings also suggest that the quantity of ER is likely to be associated with its quality (Brammer and Pavelin, 2006, 2008; Alrazi et al., 2009). That is, the higher the quantity, the higher is the quality of reporting. As an additional analysis, a Spearman's rank order correlation was performed to assess this assumption. Consistent with those prior findings, the result shows a positive and strong association ($r = 0.917$, $p < 0.01$) between QTER and QLER variables (see Table 5.14).

Table 5.14: Correlation Matrix of QTER and QLER

	QTER	QLER
QTER	1.000	
QLER	0.917** (0.000)	1.000

Notes: *p*-value is shown in parenthesis.
**. Correlation is significant at the 1% level (two-tailed).

5.3 Hypotheses Testing

This section discusses the statistical analyses undertaken to test all seven hypotheses and reports the results, subsequently.

5.3.1 Hypotheses 1 – 5: Corporate Characteristics and the Extent of EMA Implementation

Ordinal logistic regression was employed to examine the association between corporate characteristics: environmental sensitivity of industry (IND), company size (SIZE), ownership status (OWNER), EMS adoption (EMSA) and the proportion of NEDs (PNED); and the extent of EMA implementation (proxied by social issue life cycle phases: Policy, Learning and Commitment). Accordingly, the following hypotheses were tested:

H1: ***Companies in environmentally sensitive industries are more likely to implement a higher extent of EMA than those in environmentally less sensitive industries.***

H2: ***Company size is associated with a high extent of EMA implementation.***

H3: ***GLCs are more likely to implement a higher extent of EMA than non-GLCs.***

H4: ***Companies that have adopted an EMS are more likely to implement a higher extent of EMA than those that have not.***

H5: ***The proportion of NEDs is associated with a high extent of EMA implementation.***

5.3.1.1 Testing for Ordinal Logistic Regression Assumptions

In multivariate analysis, as regards sample size, on the basis of Tabachnick and Fidell's (2007) formula: ($N > 50 + 8m$), with 5 independent variables: IND, SIZE, OWNER, EMSA and PNED; it requires a sample size of at least 90 [(50 + (8*5)]. However, this requirement was not met as the sample size of the present study was below 90 (i.e. N = 78). However, based on Hair et al.'s (2010) threshold of a minimum ratio of 10:1, the sample size of 78 exceeded 50 cases requirement. Therefore, the sample size of the present study was deemed suitable for a multivariate analysis.

Accordingly, to ensure that the data fit for ordinal logistic regression analysis, preliminary analyses were performed to test the multicollinearity and outliers assumptions. If any of these assumptions are violated, a necessary action needs to be taken to avoid biased parameter estimates.

Multicollinearity Assumption

A serious multicollinearity between independent variables (r > 0.9) can dampen the accuracy of multivariate analysis (Tabachnick and Fidell, 2007; Field, 2009). To check for multicollinearity between independent variables, a Pearson's correlation analysis was performed. The results in Table 5.15 show none of the correlation coefficients exceed the threshold of 0.7 as proposed by Tabachnick and Fidell (2007). In addition, using a linear regression analysis (Field, 2009), the values of VIF below 10 provide additional support to the absence of severe multicollinearity among the independent variables.

Table 5.15: Multicollinearity – Correlation Matrix of Independent Variables

	Correlation					Collinearity Statistics	
	IND	**OWNER**	**SIZE**	**EMSA**	**PNED**	**VIF**	**Tolerance**
IND	1.000					1.023	0.977
OWNER	-0.058 (0.616)	1.000				1.102	0.908
SIZE	0.041 (0.721)	0.292** (0.009)	1.000			1.127	0.888
EMSA	-0.111 (0.345)	0.177 (0.132)	0.173 (0.141)	1.000		1.089	0.918
PNED	-0.078 (0.498)	0.011 (0.927)	-0.027 (0.814)	0.199 (0.089)	1.000	1.053	0.950

Notes: *p*-values are shown in parentheses.
**. Correlation is significant at the 1% level (two-tailed).

Outliers Assumption

As the ordinal logistic regression does not compute any diagnostic statistics, including outliers, to test for outliers, two binary logistic regressions were performed (*k*-1; where Commitment is the base group), using case selection to compare group 1 (Policy) to group 3 (Commitment), and group 2 (Learning) to group 3 (Commitment). There were no outliers (ZRE < 2.5) observed in the first analysis (between Policy and Commitment cases), while one outlier was detected (ZRE = 3.17) in the second analysis (between

Learning and Commitment cases). However, as the ZRE value did not exceed 4.0 as proposed by Hair et al. (2010), the ordinal logistic regression model with all cases is interpreted.

5.3.1.2 Correlations between Corporate Characteristics and the Extent of EMA Implementation

A bivariate analysis can be helpful in determining whether an association exists between variables. In doing so, a Spearman's rank order correlation test was performed to examine the associations between each corporate characteristic and extent of EMA implementation. Results in Table 5.16 demonstrate a positive and significant association between environmental sensitivity of industry and the extent of EMA implementation (r = 0.362, p < 0.01), as predicted. Similarly, the results also demonstrate positive but insignificant association between other corporate characteristics and the extent of EMA implementation.

Table 5.16: Correlations between Corporate Characteristics and the Extent of EMA Implementation

Corporate characteristics	TEMA[a]
IND	0.362[**] (0.006)
OWNER	0.183 (0.272)
PNED	0.084 (0.463)
EMSA	0.143 (0.471)
SIZE	0.012 (0.914)

Notes: [a]. In terms of social issue life cycle phases.
[**]. Correlation is significant at the 1% level (two-tailed).
p-values are shown in parentheses.

To provide greater explanation of associations between variables and more nuanced differentiation of group differences, ordinal logistic regression was performed.

5.3.1.3 Results of Ordinal Logistic Regression

The test of parallel line shows insignificant *p*-value ($\chi^2 = 5.12$, $p = 0.401$), suggesting that the null hypothesis that the location parameters (slope coefficients) are the same across response categories cannot be rejected. In other words, the odd for explanatory variables, i.e., corporate characteristics, is consistent across the different thresholds of the outcome variable, i.e., social issue life cycle phases. In addition, the insignificant goodness-of-fit statistic ($\chi^2(141) = 167.644$, $p > 0.05$) suggests that the model has adequate fit. Therefore, the results of the ordinal logistic regression can be interpreted accordingly. Table 5.17 summarises the regression results.

Table 5.17: Ordinal Logistic Regression Results

					95% Confidence Interval	
	β	**SE**	**Ward**	***p***	**Lower**	**Upper**
IND	-1.804***	0.556	10.549	0.001	-2.893	-0.716
SIZE	-0.154	0.154	0.995	0.319	-0.455	0.148
OWNER	-0.778	0.668	1.356	0.244	-2.089	0.532
EMSA	-1.187*	0.694	2.925	0.087	-2.547	0.173
PNED	0.000	0.020	0.001	0.980	-0.039	0.040
Chi-square (χ^2)		14.27**				
Sig. *(p)*		0.014				
R^2 (Nagelkerke)		0.208				

Notes: *, **, ***. Significant at the 10%, 5% and 1% level, respectively.
Variable definition: IND (Less Sensitive=0; Sensitive=1); OWNER (Non-GLC=0; GLC=1); EMSA (Not adopted EMS=0; Adopted EMS=1); SIZE (log-transformed total assets) and PNED (% of NEDs). By default, SPSS uses the last category (i.e. Commitment) as the reference category.

The model is statistically significant ($\chi^2(5, 78) = 14.27$; $p < 0.05$), suggesting that corporate characteristics contribute to explaining the extent of EMA implementation. The model as a whole explained 20.8% (R^2 Nagelkerke = 0.208) of the variance in the extent of EMA implementation.

The results suggest that two contingent variables are associated with the extent of EMA implementation. The negative and significant coefficient (β) for IND (β = -1.805, *p* = 0.001) indicates that controlling for all other factors in the model, companies in environmentally sensitive industries are more likely to implement a higher extent of EMA than those in environmentally less sensitive industries. Similarly, the negative and significant coefficient (β) for EMSA (β = -1.187, *p* = 0.087) indicates that those that are adopting an EMS are more likely to implement a higher extent of EMA than those without, controlling for all other factors in the model. Collectively, the results provide support for **H1** and **H4**, suggesting that environmental sensitivity of industry and EMS adoption is critical to explaining the extent of EMA implementation.

Other contingent variables: OWNER, SIZE and PNED; however, did not approach significance, which means that the extent of EMA implementation is not influenced by these variables. Hence, no support is found for **H2**, **H3** and **H5**.

5.3.2 Hypotheses 6 – 7: The Extent of EMA Implementation and ER Practices

Prior studies made it implicit that companies engaging in environmental activities should report their related environmental information (see Tilt, 2006). However, does this statement hold in the perspective of Malaysian PLCs? This leads to the last objective of the present study which seeks to empirically examine whether the extent of EMA implementation influences ER practices. Drawing on social issue life cycle theory, it is envisaged that ER practices of companies would vary across the social issue life cycle phases. More specifically, the higher the extent of EMA implementation, the higher is the quantity and quality of ER. Thus, the following hypotheses were tested:

H6: Companies in the Commitment phase are more likely to report a greater quantity of ER than those in the Policy and Learning phases.

H7: Companies in the Commitment phase are more likely to report a greater quality of ER than those in the Policy and Learning phases.

5.3.2.1 Testing for Kruskal-Wallis Test Assumption

In pursuit of testing the last research question: "*Is there a statistical difference between the level and quality of ER of companies in Policy, Learning and Commitment phase?"*, a Kruskal-Wallis test was employed. The employment of this non-parametric statistic was attributed by the non-normality of QTER and QLER where both variables were positively skewed (see Appendix I).

Although Kruskal-Wallis test is a non-parametric statistic, it assumes that the variance between groups is equal. To test the homogeneity of variance assumption, a non-parametric Levene's test was performed. The results in Table 5.18 show that the homogeneity of variance test failed to reject the null hypothesis ($p > 0.05$) that the distribution of QTER and QLER across groups is equal. Therefore, the homogeneity assumption holds and the employment of Kruskal-Wallis test to test **H6** and **H7** is plausible.

Table 5.18: Non-parametric Levene's Test (Hypothesis Test Summary)

Null Hypothesis	Test	Sig. *(p)*	Decision
The distribution of QTER is the same across categories of social phase	Independent-Samples Kruskal-Wallis test	0.065	Retain the null hypothesis
The distribution of QLER is the same across categories of social phase	Independent-Samples Kruskal-Wallis test	0.140	Retain the null hypothesis

Note: The significance level is 0.05.

5.3.2.2 Results of Kruskal-Wallis Test

As shown in Table 5.19, the mean rank values for QTER (mean = 50.65) and QLER (mean = 46.81) for companies in the Commitment phase are relatively higher than those companies in the Policy and Learning phases. The chi-square test, $\chi^2(2, 78) = 5.462$, $p = 0.065$; shows that the mean differences in QTER between phases are statistically significant at the 10% level. This indicates that companies in the Commitment phase significantly reported a higher quantity of environmental information than those in the Policy and Learning phases. In relation to QLER, the mean differences are not statistically significant ($\chi^2(2, 78)$, $p = 0.222$), which means that companies in the Policy, Learning and Commitment phases reported the same quality of ER.

Table 5.19: Results of Kruskal-Wallis Test

		Mean Ranks		Median	
Phase	**N**	**QTER**	**QLER**	**QTER**	**QLER**
Policy	16	30.94	30.63	3.50	2.04
Learning	49	39.34	40.46	6.00	4.08
Commitment	13	50.65	46.81	14.00	5.10
Total	78				
Chi-Square (x^2)		5.462*	3.930		
df		2	2		
Sig. (p)		0.065	0.140		

Note: *. Significant at the 10% level.

Using a Mann-Whitney U test, more detailed comparisons between pairs of social issue life cycle phases were reported in Table 5.20. Mann-Whitney U test is a non-parametric alternative to independent-samples *t*-test. The results suggest that there are significant differences in QTER between companies in the Policy and Commitment ($p = 0.033$) phases, and between companies in the Learning and Commitment ($p = 0.095$) phases. No significant difference, however, is observed between companies in the Policy and Learning phases.

Table 5.20: Results of Mann-Whitney U Test – Pairwise Comparison

Phase	N	QTER	
		Mean Ranks	Sig. *(p)*
Policy	16	27.47	0.177
Learning	49	34.81	
Policy	16	11.97	**0.033*****
Commitment	13	18.73	
Learning	49	29.53	**0.095***
Commitment	13	38.92	

Note: *.*** Significant at the 10% and 1% level.

In summary, the results of Kruskal-Wallis test and Mann-Whitney U test support **H6** that companies in the Commitment phase reported a greater quantity of ER than companies in the Policy and Learning phases. Although the variability in the extent of EMA implementation is found to be associated with the quantity of ER, no similar effect is found on the quality of ER. Therefore, no support is found for **H7**.

5.4 Perceptions of Management on EMA Implementation and ER Practices

Issues regarding EMA implementation are emerging, especially in developing countries including Malaysia. In this respect, the inputs from people in the industry on the related issues provide a very useful insight to the present study in that the empirical findings can be further supported in view of the diverse needs of companies to enhance the EMA as well as ER practices.

Gathered from the open-ended question included in the postal questionnaires, several respondents offered their views on EMA implementation and its link with ER practices. The respondents highlighted certain problems and hindrances which can be segmented into several themes.

Need for More Government Intervention

One of respondents believed that the role of the government in encouraging companies to engage in ER and EMA practices is substantially important. The respondent said,

> It is very essential to create more awareness among public and corporates in [the] importance of addressing environmental issues. One of the most effective approaches is by conducting more empirical study on the cost-benefit of being environmental friendly and it should be published... Government being the authority has to impose more stringent regulations (**ID8**).

A similar remark has been articulated by another respondent,

> [There is] still lack [of] push by the government in the form of incentives, guidelines and enforcement by relevant authorities [on ER and EMA practices] (**ID42**).

Being regulated by the listing requirements, PLCs are legally compelled to such requirements to ensure they are able to continue to trade in the market. Thus, with such an option, the CSRR mandate can be seen as an initial step in a process to embolden the socially and environmentally responsible practices among PLCs. However, as pointed in prior studies (Alrazi et al., 2009; Zainal et al., 2013), the mandate only covers four broad CSR themes without specific indication on the reporting requirements.

In relation to perceived lack of government intervention in terms of ER in general and EMA implementation in particular, there is a call for refining the existing legislation which governs the current environmental practices of companies. In this regard, the collaboration between professional bodies, academicians and the government is of significance. More specifically, the respondent said,

> Malaysia still has no official/proper framework for environmental accounting and reporting. Thus, there is a need to formalise such framework/policy which could be initiated by the academicians, MIA, MASB etc. The lack of [standardised] framework will make it hard for the preparer of the accounts to report on environmental matters on a consistent basis (**ID47**).

EMA Implementation Should Be Regulated?

Besides the comments in favour of more stringent regulation and government intervention, some of the respondents held the view that environmental sensitivity of industry should be the cut-off-point for determining the legal requirement for EMA implementation. In particular, one respondent mentioned,

> A balanced approach should be considered. Industries which generate pollutants and toxic wastes should be required to embrace and implement EMA/EMS. Others [other industries] should consider implementing [the EMA] to the extent that makes sense from the cost vs. [versus] benefits perspectives (**ID3**)

Such sentiment towards companies' environmental activities, to a certain degree, is consistent with earlier findings of the present study where it is evident that the extent of implementation of items relating to environmental cost-benefit analysis is slightly higher than the other two EMA subscales.

Likewise, another respondent further emphasised that any effort on regulating EMA implementation should be measured by environmental sensitivity of industry. With respect to this, the respondent stated,

> EMA has minimal impact on the company as we primarily involve in finance industry (**ID57**).

Overall, based on the comments received, two key themes can be broadly summarised. One, there is a need for a transformation in the current ER legislative which necessitate a profound involvement of the government. Second, in support for the transformation, it should be, however, within the context of cost effectiveness. That is, companies with greater environmental impacts must be required to implement EMA while those with lesser environmental impacts should be given a different option of implementation.

5.5 Conclusion

This chapter has been devoted to the presentation of the findings of the study. Three main topics were examined. First, the present study examined the extent of EMA implementation among Malaysian PLCs. Three subscales were used to measure the extent of EMA implementation, namely, inclusion of environmental information into existing MASs (INC), stand-alone environmental accounting procedures (STA) and environmental cost-benefit analysis (ECA). The overall mean scores were averaged (if at least half of the items in the scale are valid) to obtain the TEMA score. The higher the TEMA score, the higher the extent of EMA implementation. The descriptive results show that the extent of EMA implementation among the sample companies is moderate and that a greater emphasis is placed on ECA subscale.

Second, drawing on contingency theory, the present study sought to investigate the association between corporate characteristics: environmental sensitivity of industry, company size, ownership status, EMS adoption and the proportion of NEDs; and the extent of EMA implementation. The theory suggests that corporate characteristics may influence the implementation of MAS (Otley, 1999; Chenhall, 2003; Abdel-Kader and Luther, 2008). Third, the present study also investigated the association between the extent of EMA implementation and ER practices from the perspective of social issue life cycle theory. For the purpose of having a consistent TEMA variable to accomplish the second and third objectives, companies were first grouped into three social issue life cycle phases: Policy, Learning and Commitment; in accordance to Nasi et al.'s (1997) discussion on the characteristics of companies with regard to corporate social responsiveness. The results of the ordinal logistic regression suggest that only environmental sensitivity of industry and EMS adoption are associated with the extent of EMA implementation. Pertaining to the association between EMA implementation

and ER practices, the results show that companies in the Commitment phase reported more environmental information that those in the Policy and Learning phases.

Table 5.21 summarises the findings of the hypotheses testing as well as the statistical analysis undertaken to test the hypotheses. The following chapter, Chapter 6, discusses the findings of the study in greater details.

Table 5.21: Summary of Hypotheses Testing

Hypotheses	Statistical test	Results
H1: Companies in environmentally sensitive industries are more likely to implement a higher extent of EMA than those in environmentally less sensitive industries.	Ordinal logistic regression	**Supported** (p<0.01)
H2: Company size is positively associated with the extent of EMA implementation.	Ordinal logistic regression	Not supported (p>0.05)
H3: GLCs are more likely to implement a higher extent of EMA than non-GLCs.	Ordinal logistic regression	Not supported (p<0.01)
H4: Companies that have adopted EMS are more likely to implement a higher extent of EMA than those that have not.	Ordinal logistic regression	**Supported** (p<0.10)
H5: The proportion of NEDs is positively associated with the extent of EMA implementation.	Ordinal logistic regression	Not supported (p>0.05)
H6: Companies in the Commitment phase are more likely to report a greater quantity of ER than those in the Policy and Learning phases	Kruskal-Wallis test/ Mann-Whitney U test	**Supported** (p<0.1 & 0.05)
H7: Companies in the Commitment phase are more likely to report a greater quality of ER than those in the Policy and Learning phases.	Kruskal-Wallis test	Not supported (p>0.05)

CHAPTER SIX

DISCUSSION

6.0 Introduction

While the preceding chapter presented the findings of the study, the current chapter aims to discuss the findings in view of the extant literatures as well as from the perspective of Malaysian PLCs, especially, in terms of the legal requirements, existing government initiatives concerning environmentally responsible as well as the respondents' comments.

The chapter begins with a discussion on the extent of EMA implementation among Malaysian PLCs. Next, the associations between corporate characteristics: environmental sensitivity of industry, company size, ownership status, EMS adoption and the proportion of NEDs; and extent of EMA implementation are carefully deliberated. Prior to discussing the association between the extent of EMA implementation and ER practices, the quantity and quality of ER of the sample companies are first reviewed. The final section concludes the chapter.

6.1 The Extent of EMA Implementation

During the past decades, there has been a growing interest into the concept of green accounting or accounting for the environment. This effect is pervasive amongst accountants and that can be attributed to the expansion of their traditional accounting practices to include the measurement of non-financial data (Collins et al., 2011). Such a change, in turn, necessitates a proper alignment of accountants' commitments to integrate both financial and non-financial information. The conventional accounting

practices, however, only emphasis on describing economic events where environmental information is treated as overhead costs (Burritt, 2004; De Beer and Friend, 2006; Raiborn et al., 2011). To compensate for the inadequacies of conventional accounting practices in measuring environmental information, EMA was designed to meet the needs for companies to satisfy their stakeholders who require environmental-related information (Burritt et al., 2002; Schaltegger et al., 2003). Nonetheless, unlike financial reporting, there is no generally accepted accounting standard stipulating the reporting of quantified environmental information, to date. In Malaysia, for example, although there is a requirement set by the Bursa Malaysia for PLCs to report their CSR activities in the annual reports, it is lack of specific reporting requirements (Alrazi et al., 2009; Zainal et al., 2013). In such a situation, previous studies suggest that companies seem to be less responsive towards EMA implementation and that the implementation was low (Frost and Wilmshurst, 2000; Frost and Seamer, 2002; Ferreira et al., 2010; Jalaludin et al., 2011; Christ and Burritt, 2013).

Contrary to previous findings (Frost and Wilmshurst, 2000; Frost and Seamer, 2002; Ferreira et al., 2010; Jalaludin et al., 2011; Christ and Burritt, 2013), the present study found a moderate extent of EMA implementation among the sample companies. As far as social issue life cycle phases are concerned, the vast majority of companies are in the Policy (16 companies; 20.5%) and Learning (49 companies; 62.8%) phases, while 13 companies (16.7%) are in the Commitment phase. The relatively low percentage of companies in the Commitment phases suggests that the involvement of accountants in companies' environmental undertakings is still limited, which is consistent with an earlier suggestion that the role of accounting in environmental spheres is very minimal (Lodhia, 2003; Hopwood, 2009; Collins et al., 2011; Deegan, 2013). In addition, the high N/A responses in the present study should not be overlooked. It is important to

note that N/A responses were not included in the mean calculation. While accepting the possibility of non-applicable responses might be due to intra-industry variations, there is also a possibility that the respondents are less familiar with EMA (Ferreira et al., 2010). Interestingly, nine companies marked N/A to all items. Such a declaration that they are not liable for any environmental impacts suggests a lack of environmental awareness considering that the consumption of water, energy and paper is common and widespread in all type of business industries (Frost and Wilmshurst, 2000; IFAC, 2005).

From the EMA subscales standpoint, it appears that companies put marginally more emphasis on environmental cost-benefit analysis subscale than the inclusion of environmental information in existing MASs and stand-alone environmental accounting procedures subscales. This finding seems resonated by Bartolomeo et al.'s (2000) findings that many companies are implementing EMA as an experimental project and that it is part of their due diligent process. More specifically, companies' decision with regard to EMA implementation may largely be influenced by the cost effectiveness of the activities (Bartolomeo et al., 2000). In fact, one respondent in the questionnaire links EMA implementation with costs implications for companies if the implementation to be legally mandated. As far as EMA policy is concerned, there are remarks made by several respondents on the need for a more pragmatic or holistic approach to measuring and reporting environmental information to support the measurement and reporting processes. Furthermore, there is a call for the government, in its role as regulator, to play a more active role in promoting EMA implementation. Interestingly, one respondent suggested that the benefits of EMA should be publicised in order to spread the awareness among companies. Such a view indeed has been raised by Burritt et al. (2009) that companies are more likely to accept EMA when they witness the benefits of the actual implementation in other company of a similar industry. Despite this however,

subjecting all companies to implement EMA does not appeal to all respondents. While one respondent remarked that EMA implementation should be made mandatory only for companies that have a greater impact on the environment, another respondent stated that EMA is less significant to the company because they are in finance industry. Such a response is disheartening but not surprising. In recent years, nonetheless, there is an encouraging involvement of finance institutions in sustainable development as suggested in extant literature (Mohd Said et al., 2013; Allet, 2014). These institutions although not environmentally sensitive, they do have a significant role in environmental responsibilities in such a way that they are providing funding for business activities. Failure to assess environmental risks of the potential clients may result in a greater exposure to environmental degradation.

On the basis of the above discussion, the uncertainty regarding EMA implementation may explain why such implementation is not prevalent among the sample companies. Moreover, these companies, on average, perceived their business environmental impacts other than those of a general nature as less significant. This may also reflect the usefulness of EMA. Accordingly, the limited use of EMA suggests that companies still adhere to conventional profit-maximising objectives. As far as Malaysian accountants are concerned, there is a relatively low institutional pressure via professionalism with regard to environment-related issues (Jalaludin et al., 2011). It is, therefore, not surprising that the orientation and understanding of companies on accounting to be rather conventional.

6.2 The Association between Corporate Characteristics and the Extent of EMA Implementation

The five contingent variables examined in the present study were features of corporate characteristics, which are, environmental sensitivity of industry, company size, ownership status, EMS adoption and the proportion of NEDs. Drawing on contingency theory, these variables were hypothesised to influence the extent of companies' EMA implementation. To ensure the consistency of EMA variable in both contingency model and social issue life cycle model (see Chapter 3), the extent of EMA implementation was transformed into social issue life cycle phases: Policy, Learning and Commitment; with Policy represents the low and Commitment represents the high extent of EMA implementation. An ordinal regression analysis was performed to test the association between these contingent variables and the extent of EMA implementation.

Overall, the ordinal logistic regression model is significant ($p < 0.05$), suggesting that the variance in the extent of EMA implementation is explained by corporate characteristics. The model explains approximately 20.8% (R^2 Nagelkerke) of the total variance and seems satisfactory within the context of a cross sectional study. To ease the interpretation, the association between each corporate characteristic and the extent of EMA implementation is discussed in turn.

6.2.1 Environmental Sensitivity of Industry and the Extent of EMA Implementation (H1)

Consistent with previous findings (Frost and Seamer, 2002; Ferreira et al., 2010; Christ and Burritt, 2013), environmental sensitivity of industry is found to be associated with the extent of EMA implementation. In particular, companies in environmentally

sensitive industries are more likely to further into EMA implementation than companies in environmentally less sensitive industries, providing support to **H1**.

Because environmentally sensitive industries are at greater risk of adversely affecting the environmental, there is a greater pressure for companies in these industries to appear legitimate in the eyes of their stakeholders. Furthermore, attaining legitimacy is now regarded as a corporate strategy that goes beyond mere reporting descriptive environmental information. This is reiterated by a significant growth in stakeholders' demand for information related to companies' environmental performance (Deegan and Rankin, 1997; Murray et al., 2006; De Villiers and Van Staden, 2010; Mohd Said et al., 2013). Given that conventional accounting practices do not support the measurement of environmental information (Burritt et al., 2002; Schaltegger et al., 2003; Burritt, 2004), the absence of EMA will limit the environmental considerations within companies' business decisions. Thus, the process of 'informing and educating' the stakeholders about companies' environmental performance can be very challenging (Frost and Seamer, 2002). Ultimately, the generation of both physical and monetary environmental information through EMA can enhance companies' ER practices, and most importantly, their internal decision makings (Burritt et al., 2002; Bennett et al., 2002b).

Environmentally sensitive industries are also facing greater regulatory pressures. In Malaysia specifically, a strict regulation on scheduled waste management has been enforced among manufacturing or industrial companies, requiring them to report their scheduled waste management of recurring basis. It also has been reported that the wastewater and effluents standard in Malaysia is much stricter than Japan (Japanese Chamber of Trade & Industry Malaysia, 2000). In addition, under the National Policy on the Environment (NPE), developers are obliged to adhere to maintaining the three

aspects of sustainability – economic, social and cultural development and environmental conservation, in any business development[34]. They are also required to submit an EIA prior to conducting any infrastructure development. With all the requirements which companies in environmentally sensitive industries are bounded to abide, it certainly will intensify a greater need for considering environmental information as part of corporate business strategies. Moreover, companies in a highly regulated environment will normally respond to the regulatory pressure by acting in accordance with the rules that have been set upon them. This is to avoid any penalties or to minimise future regulatory costs. Oftentimes, non-compliance costs are significant, even can be more costly than compliance costs (Epstein, 2008). In Malaysia, under the EQA 1974, a non-compliance case can be subjected to a fine (from RM10,000 to RM500,000) or imprisonment (from two to five years), or a combination thereof (Mustafa, 2011). Non-compliance cases may also increase the likelihood for a more stringent regulation to be imposed in the future (Patten, 1992; Patten and Trompeter, 2003). Besides fines and regulatory costs, negative publicity in consequence of non-compliance cases may adversely affect companies' future financial position. In addition, restoring the public trust requires companies to be reactive to future events (Suchman, 1995; O'Donovan, 2002), perhaps to the extent that having to be more transparent than they were before.

6.2.2 Company Size and the Extent of EMA Implementation (H2)

Company size is reported to play a substantial role in influencing companies' decision to implement MASs. Ideally, the larger the company, the larger the capital and human resources, and the greater is the opportunity to adopt sophisticated management accounting techniques (Ezzamel, 1990; Chenhall, 2003; Abdel-Kader and Luther, 2008; Cadez and Guilding, 2012). In generating environmental information, the involvement of large sums (Ahmad et al., 2003; Dahlmann et al., 2008) limits the generation of such

[34] *Environment Policy.* Retrieved on September 3, 2012 from http://www.doe.gov.my/portal/jabatan/dasar-alam-sekitar/

information to large companies (Ribeiro and Aibar-Guzman, 2010). It has also been suggested that large-scale business activities create a greater environmental risk exposure, and thus necessarily invite a greater level of scrutiny from the stakeholders (Hackston and Milne, 1996).

While a number of empirical studies found that large companies are more likely to implement a higher extent of EMA (Frost and Seamer, 2002; Ribeiro and Aibar-Guzman, 2010; Christ and Burritt, 2013), the present study found the contrary. This finding however is consistent with that found by Ferreira et al. (2010). The non-significance of company size may be due the adherence to conventional profit-maximising, which may marginalise the effect of company size on environmental considerations. The insignificant result offers a tentative explanation for the effect of company size on the extent of companies' EMA implementation. Overall, no support is found for **H2**.

6.2.3 Ownership Status and the Extent of EMA Implementation (H3)

It has been almost 10 years after the first initiation of GLCs Transformation Program in 2004. Throughout the years, GLCs remain as the main service providers to key strategic utilities and services in Malaysia. In addition, providing benefit to the stakeholders has been continuously embedded in the GLCs' manifesto. Specially, the Silver Book which was introduced in 2005 and later its BPN in 2012, outlines ways and guidelines for GLCs to contribute to the society, including on the environment. The government also has promoted many green initiatives to encourage sustainable business practices among companies, for example, the Green Technology Financing Scheme (GTFS) which provides financial supports to companies engaging in green technologies and tax rebates on various green activities/policies relating to the greening of the economy. Given these

unique features of GLCs which clearly make them 'visible', they are ideally placed to promote 'best practice' in sustainable development to accord to the government's effort.

While ownership status was found to influence ER and CSR practices (Cormier and Gordon, 2001; Amran and Susela, 2008; Said et al., 2009; Wan Abdul Rahman et al., 2011), the present study found that there is no similar effect to the extent of EMA implementation. More specifically, GLCs and non-GLCs implement the same extent of EMA implementation, resulting in the rejection of **H3**. This insignificant result can be attributed to low environmental considerations among Malaysian PLCs, in general. Prior literature has demonstrated that environmental information was the least information disclosed by companies among the CSR dimensions (Thompson and Zakaria, 2004; Bursa Malaysia, 2007; Amran and Susela, 2008; Said et al., 2009; Mustaruddin et al., 2010; Wan Abdul Rahman et al., 2011; Zainal et al., 2013). Furthermore, in the progress review of GLC Transformation Programme for the year ended 2013, it was reported that while major benefits to social contribution are prevalent among GLCs, there is a limited number of environmental initiatives undertaken.

6.2.4 EMS Adoption and the Extent of EMA Implementation (H4)

An EMS is a voluntary environmental initiative focusing on providing assistance to companies to minimise their environmental impacts (Melnyk et al., 2003) to meet legal requirements (Steger, 2000; Welch et al., 2002; Bansal and Hunter, 2003). To accomplish this, the system is tailored to each company's environmental goals. For the EMS to be effective, companies need to ensure that their environmental impacts are accurately identified and recorded so as to support the controlling and benchmarking processes. More specifically, by valuing their business environmental impacts,

companies are able to determine, for example, whether they are in conformity with the regulations or whether they achieve the targets. Furthermore, as part of EMS requirements – ISO 14001, companies are required to carry out periodic audit to assess whether the EMS is suitable and sound (ISO, 2009). Thus, to support the above activities, the implementation of EMA is necessary (Jasch, 2009; Ribeiro and Aibar-Guzman, 2010). In the present study, all companies that adopt an EMS carried out EMS audit.

Consistent with the prediction, the ordinal logistic regression result confirms the positive and significant association between EMS adoption and the extent of EMA implementation, suggesting that companies with an EMS in place implement a greater extent of EMA than those without. This is consistent with Ribeiro and Aibar-Guzman's (2010) findings that the extent of EMS practices is associated with the extent of environmental accounting practices. This finding, however, should be interpreted cautiously as the result is significant at only the 10% level. The sheer size of the sample companies from those without an EMS (83.3%) may affect the statistical power of the analysis conducted (Pallant, 2011). Nonetheless, the issue of homoscedasticity is not a great concern in the present study. Taken together, there is support for **H4**.

6.2.5 The Proportion of NEDs and the Extent of EMA Implementation (H5)

In corporate governance circles, the presence of NEDs on a corporate board will enhance board effectiveness by minimising agency problems. A NED does not hold any position in the management team, representing the external views (Haniffa and Cooke, 2005). Thus, a group of NEDs act as a check-and-balance to ensure that while the shareholders' values are maximised, the stakeholders' interests are equally satisfied (Haniffa and Cooke, 2005).

The importance of NEDs has been notarised in the Listing Requirement of Bursa Malaysia (Chapter 15, Part B, Paragraph 15.02(1)) and Malaysian Code of Corporate Governance where at least two of the directors or one-third of the board members (whichever is the higher) must be independent. When the Chairman of the board is not a NED, the board must comprise a majority of independent directors. NEDs are also responsible for building and maintaining corporate image and reputation (Said et al., 2009). Given these special attributes of NEDs and that environmental issues are not peripheral to corporate reputation, the presence of a large proportion of NEDs is likely to enhance the company's environmental responsiveness (Haniffa and Cooke, 2005; Brammer and Pavelin, 2008; Said et al., 2009).

Despite the role of NEDs in board effectiveness, the present study found that the proportion of NEDs does not influence the extent of EMA implementation, which means that **H5** is not supported. Furthermore, with $\beta = 0.000$, it appears that the extent of EMA implementation is practically unaffected by the proportion of NEDs. The insignificance of PNED reinforces the previous findings that NEDs have a limited role in companies' internal environmental practices (Haniffa and Cooke, 2005; Brammer and Pavelin, 2008; Said et al., 2009). Perhaps, as the roles of NEDs predominantly revolve around the policy making and monitoring exercises eventually leaving a direct involvement to day-to day management to executive directors (Lanis and Richardson, 2011). This could also be due to the lack of environmental awareness on the part of NEDs that marginalised their voices on companies' environmental practices.

6.3 The Association between the Extent of EMA Implementation and ER Practices (H6 and H7)

On what basis do companies report their environmental information?. Such an issue has long been debated in prior ER literature. Increasing evidence shows that companies tend to disclose narrative environmental information as opposed to quantified environmental information in an attempt to attain legitimacy (see Hackston and Milne, 1996; Ahmad et al., 2003; Ferreira, 2004; Nik Ahmad and Sulaiman, 2004; Jaffar, 2006; Yusoff et al., 2007; Alrazi et al., 2009; Buniamin, 2010). Supposedly, the lack of appropriate measures to assess environmental information makes narrative information is preferable. Furthermore, if companies are merely paying lip-service on their environmental performance, it makes sense for them not to implement EMA to generate relevant environmental information in the first instance.

However, also of relevance is the issue of non-reporting of EMA information. The findings of Masanet-Llodra (2006) have shed a valuable insight that the generation of EMA information does not necessary lead to its reporting. The study found that EMA information was largely used for internal decision makings. Similarly, Criado-Jimenez et al. (2008) also found that companies were relatively hesitant to disclose their environmental accounting information notwithstanding the stipulated standard in ER which requires the reporting of such information in the financial report. In a more recent study, Monteiro and Aibar-Guzman (2010) found that the adoption of an accounting standard requiring the disclosure of environmental information positively influenced the extent of ER, but the reporting of environmental performance indicators was very minimal.

As much as the former instances entail an urgent attention, equally, a similar amount of concern must be placed on the latter. The commitment towards the environment is all about being accountable for it. The dissemination of quantified environmental information externally may reflect upon the visibility of companies towards their environmental activities, which subsequently may empower a sense of responsibility towards the impacts. To further elaborate this idea, a social issue life cycle theory is used as interpretive lens. Based on the theory, it is believed that companies' responsiveness towards environmental issues are associated with the extent to which they perceive the importance of such issue to be addressed (Nasi et al., 1997). In this regard, companies can be segmented into three social issue life cycle phases: Policy, Learning and Commitment. Companies in the Policy phase generally ascribe environmental issues as managerial concern and that no formal action is carried out to address the issue. Companies are in the Learning phase once the environmental awareness begins to widespread. Usually, an environmental specialist or professional is hired to implement the companies' environmental policy as environmental issues have yet to become significant in companies' economic decisions. When addressing environmental issues become a priority, such information is integrated into companies' existing MASs to support business decision makings (Nasi et al., 1997). As such, the consideration of environmental information within economic decisions will stimulate the reporting of such information externally to reflect companies' commitment towards their business environmental impacts. Therefore, from the social issue life cycle theory, it is reasonable to assume that there is an association between EMA implementation and ER practices.

Consistent with prior studies that suggest ER practices among Malaysian companies are still at infancy (Ahmad et al., 2003; ACCA, 2003b; Nik Ahmad and Sulaiman, 2004;

Yusoff et al., 2007; Alrazi et al., 2009; ACCA, 2010a; ACCA, 2010b; Buniamin, 2010), the present study found that the ER practices of the sample companies are not encouraging. On average, the sample companies reported 17.96 sentences regarding the environment with a quality score of 6.68 (out of 100), which is not even achieved 50% of the intended disclosure index. Furthermore, there is very limited disclosure of physical and monetary environmental information. In particular, less than one-third of the sample companies reported physical environmental information such as the amount of wastes, the volume of effluents discharged and the amount of energy consumed. Let alone, only four companies managed to report monetary environmental information which were predominantly on the amount spent to enhance corporate environmental performance and/or summary of savings (in RM) arising from environmental initiatives.

When contrasted among social issue life cycle phases, the differences in the quantity of ER are apparent. More specifically, companies in the Commitment phase reported almost twice as much as environmental information of those in the Policy phase. The pair comparisons further indicate that there is a significant difference in the quantity of ER between companies in the Commitment and Policy ($p < 0.05$) phases, and between companies in the Commitment and Learning ($p < 0.10$) phases. No significant difference, however, is found between companies in the Policy and Learning phases.

No similar trend is found with regard to the quality of ER. Although the overall quality score of companies in the Commitment phase is higher than those in the Policy and Learning phases, the differences are not significant. This suggests that a similar quality of ER is produced by companies regardless the phases they are in. In other words, the variability in the extent of EMA implementation does not affect the quality of ER. One possible explanation is the lack of accountants' engagement in the preparation of

environmental information for reporting purposes. Of the sample companies, only seven have their accounting department involved in the preparation of ER, of which further explain the relatively small number of companies reported physical and monetary environmental information. The absence of specific reporting requirements may also be the contributing factors, putting no pressure on companies to quantify their environmental information.

The nonexistence of an association between EMA implementation and quality of ER provides support to previous findings where EMA information was largely used for decision-making purposes rather than external reporting (Masanet-Llodra, 2006; Criado-Jimenez et al., 2008). More importantly, the insignificant result is another testament that confirms the assertion that a lack of regulation on ER leads to the incomprehensiveness of ER (see Adams, 2004; O'Dwyer and Owen, 2005; Radiah and Rashid, 2010; Gillet, 2012).

On the basis of the above discussion, the results provide support to social issue life cycle theory that the integration of environmental information in business decisions leads to the reporting of such information to the stakeholders. However, the reporting is merely reflected by the quantity, not quality. Therefore, only **H6** is supported, while no support is found for **H7**.

6.4 Conclusion

The findings of the present study highlight some interesting insights concerning EMA implementation among Malaysian PLCs as well as its link with ER practices. Despite the moderate extent of EMA implementation, a majority of companies are in the Policy and Learning phases. The sample companies seem to place a relatively more emphasis

on environmental cost effectiveness activities. Furthermore, environmental sensitivity of industry and EMS adoption are found to contribute substantially in influencing the extent of companies' EMA implementation. More specifically, companies in environmentally sensitive industries and those adopting EMA appear to implement a higher extent of EMA than their counterparts. Company size, ownership status and the proportion of NEDs, however, did not make any significant contribution to companies' decision to implement EMA. From the contingency theory perspective, the results of the present study provide sufficient evidence to the theory that suggests companies' characteristics, i.e. contingent variables; play a significant role in influencing the implementation of EMA.

As regards the association between EMA implementation and ER practices, the present study found a limited support to social issue life cycle theory in that the association is only significant with regard to the quantity of ER. In contrast, as far as the quality of ER is concerned, a uniform attribute is shared between companies in social issue life cycle phases.

Overall, due to the small sample size, the results of the present study need to be interpreted with caution. The last chapter, Chapter 7, offers a summarisation of the whole thesis.

CHAPTER SEVEN

CONCLUSIONS

7.0 Introduction

In this last chapter of the thesis, the main findings of the study are summarised and general conclusion based on the findings presented in Chapter 5 and 6 are described. In the first section, the whole study is revisited, to include the objectives of the study, research methods undertaken and the recapitulation of research findings. Next, the contributions of the study to the extant literature and practice are highlighted in the second section. Lastly, the limitations of the present study and suggestions for future research are discussed.

7.1 Revisiting the Study

The objectives, research methods and key findings of the present study are summarised below.

7.1.1 Objectives of the Study

The greatest concern of the present study has been directed to companies' EMA practices, in accordance with the importance of accounting in addressing environmental issues (Gray, 2010; Hopwood et al., 2010). A small, but growing body of research has been conducted on EMA (Bouma and Van der Veen, 2002; Ferreira et al., 2010; Christ and Burritt, 2013). Within this limited domain, there is very little empirical work examining the association between companies' EMA implementation and ER practices (Frost and Seamer, 2002; Tilt, 2006; Ferreira et al., 2010). It is of importance to examine such an association considering the incomparability and incompleteness of ER

(Adams, 2004; Owen, 2008; Othman and Ameer, 2010; Bouten et al., 2011; Gillet, 2012) may take its toll on the credibility of ER as a platform to report companies' environmental performance. A considerable number of previous ER research have assumed that companies that engage in environmental activities should report information related to such activities (see Tilt, 2006). However, with an exclusive focus on companies' ER, it is likely to depict only part of the picture of companies' ER practices (Tilt, 2006). Thus, the objectives of the present study were threefold. First, the present study examined the extent to which Malaysian PLCs implement EMA. To measure the extent of EMA implementation, three EMA perspectives were taken into account: i) the inclusion of environmental information in existing MASs, ii) stand-alone environmental accounting procedures, and iii) environmental cost-benefit analysis.

Second, drawing on contingency theory, the association between corporate characteristics, namely, environmental sensitivity of industry, company size, ownership status, EMS adoption and the proportion of NEDs; and the extent of EMA implementation was examined. While there has been numerous empirical application of the theory in management accounting research, its application in EMA research is still limited (Bouma and Van der Veen, 2002; Qian et al., 2011; Christ and Burritt, 2013), partly because EMA research is still in its early stage. Contingency theory suggests that factors surrounding the company can have a significant impact on the implementation of its MAS (Otley, 1999).

The last objective of the study aimed to examine the association between the extent of EMA implementation and ER practices. More specifically, the present study examined whether the EMA implementation enhances the quantity and quality of ER. At present, there is no clear consensus on whether there is an association between companies'

internal and external environmental strategies. However, limited evidence shows that EMA information was predominantly used for internal decision making purposes (Masanet-Llodra, 2006; Criado-Jimenez et al., 2008). The investigation of the association between EMA implementation and ER practices thereby provide a more nuanced understanding on the link between EMA and ER. In the present study, such an association is explained from the perspective of social issue life cycle theory. The theory holds that a high commitment towards the environment will result in improved ER practices.

7.1.2 Research Methods

To achieve the objectives of the present study, two research methods were employed. First, postal questionnaires were used to gather data on the extent of EMA implementation among Malaysian PLCs. The questionnaires were addressed to CFO/Finance Director as it is strongly believed that they have sufficient information concerning the accounting practices of the companies (Bebbington et al., 1994; Haniffa and Cooke, 2005). Prior to the administration of the questionnaire, it was pre-tested among 6 accounting lecturers and 5 accountants. Subsequently, 6 CFOs participated in the pilot test.

The three EMA subscales used to measure the extent of EMA implementation were adapted from Frost and Wilmshurst's (2000) study, with additional items retrieved from prior studies, e.g., Frost and Seamer (2002) and Ribeiro and Aibar-Guzman (2010). A 5-point Likert scale ranging from 1 (Never) to 5 (Very often) was used to measure the extent of implementation. A N/A option was also provided considering the implementation of several items may vary among industries. To ensure the validity and reliability of the scale, Cronbach alpha (α) and PCA were performed. Next, the average

responses score was computed, excluding N/A responses, to indicate the extent of implementation. Using the computed score, companies were then grouped into three social issue life cycle phases: Policy, Learning and Commitment. The cut-off points were deliberately determined to reflect the characteristics of social issue life cycle theory as discussed by Nasi et al. (1997) as well as to ensure that the number of observations in each category was large enough to facilitate statistical testing. They are as follows: Policy (score $\leq$ 2.00); Learning (score ranging from 2.01 to 3.59) and Commitment (score $\geq$ 3.60).

Second, a content analysis of corporate annual reports was undertaken to assess the quantity and quality of ER. An environmental checklist was developed to provide the parameter to determine information pertain to environmental aspect. Based on the parameter, a sentence count measurement was used to measure the quantity of ER. An environmental disclosure index was formulated with regard to quality of ER. Items were mainly derived from GRI (2011) with several items retrieved from prior ER literature (i.e. Clarkson et al., 2008; Alrazi et al., 2009; Beck et al., 2010). In total, the index comprised 52 items, subdivided into 8 categories. To quantify the quality of ER, an unweighted score measurement, that is, "0" for non-disclosure and "1" for disclosure (Cooke, 1989; Owusu-Ansah, 1998; Alrazi et al., 2009) was utilised. Altogether, a total score of 100 was allocated. A construct validation for both disclosure checklist and index was performed by three accounting professors and one professional. A test-retest analysis was also performed using a sample of 20 randomly selected annual reports (Krippendorff, 2004) two months after the initial coding in an attempt to assess the consistency of the coding output.

Next, each variable was screened for missing data, normality, outliers and homoscedasticity. Descriptive statistics – frequency, mean and SD; were performed to describe the variables. The association between corporate characteristics and the extent of EMA implementation was tested via ordinal logistic regression. For each categorical variable, companies were segmented into two groups: environmental sensitivity of industry – environmentally sensitive and environmentally less sensitive industries; ownership status – GLCs and non-GLCs; and EMS adoption – those that have adopted an EMS and have not. A dummy variable was created for each of these variables. For company size, total assets (log-transformed) was used as a proxy, while the proportion of NEDs was computed by the proportion of total number of NEDs over total number of directors. To examine the association between EMA implementation and ER practices, Kruskal-Wallis test and Mann-Whitney U test were performed. The employment of these non-parametric statistics was driven by a non-normal distribution of both quantity and quality of ER scores.

7.1.3 Key Findings

While the results obtained from the questionnaire survey show that some of the sample companies are engaging in environmental functions, such as having an environmental department, allocating personnel to address environmental issues and hiring environmental professionals to deal with companies' environmental issues, the extent of EMA implementation among the companies was found to be moderate. In addition, a slightly higher emphasis was placed on environmental costs-benefit analysis subscale than those of the inclusion of environmental information in existing MASs and stand-alone environmental accounting practices subscales. As far as social issue life cycle phases are concerned, more than 60% of the sample companies were in the Learning phase. Taken together, the results suggest that there is a limited involvement of

accountants in companies' environmental efforts. Consequently, EMA can be regarded as less significant, which is also emphasised by the low perceived significance of companies' business environmental impacts other than those of a general nature. The low response rate in the present study, to some extent, echoes the uncertainty of Malaysian PLCs on EMA implementation.

Comments from the respondents emphasised the importance of a comprehensive approach to EMA to encourage a greater implementation among companies. At present, the process of measuring and reporting of environmental information is very challenging because no proper framework for EMA and ER is available. Overall, refining the current legislation which governs the current environmental practices of companies is a call for. However, to some, mandatory EMA implementation should only be imposed to companies in environmentally sensitive industries, while those in environmentally less sensitive industries should be on the basis of cost effective as EMA is less relevant to the industries. Besides legislation, the benefits of EMA should also be publicised so that the awareness among companies can be heightened.

Theoretical insights offered by contingency theory argue that the external and internal surroundings of a company such as size, industry and corporate strategy (Otley, 1999; Chenhall, 2003; Abdel-Kader and Luther, 2008) will shape its MAS. Overall, the results of the present study provide some empirical support on the influence of contingent variables on the extent of EMA implementation. More specifically, environmental sensitivity of industry and EMS adoption were found to have a significant association with the extent of EMA implementation. However, despite predictions developed from existing EMA as well as CSRR/ER literature, no significant associations were observed

between the extent of EMA implementation and ownership status, company size and the proportion of NEDs.

Turning to ER practices, on average, the quantity and quality of ER of the sample companies was not very encouraging. Although some of the companies managed to report a lengthy ER, none of the companies exceeded half of the allocated quality score. In addition, the reporting of physical and monetary environmental information was still lacking especially the latter. Instead, more concentration was given on reporting narrative environmental commitments. Overall, the results provide somewhat partial support to social issue life cycle theory. In particular, while the quantity of ER between companies in social issue life cycle phases was found to be significantly differed, the disclosure pattern *vis-à-vis* quality of ER was not. Consistent with the prediction, companies in the Commitment phase reported a higher quantity of environmental information than those in the Policy and Learning phases. Therefore, the high commitment towards the environment as manifested by the Commitment phase was associated with the quantity of ER per se, not the quality of ER.

The above results appear to be in agreement with previous studies (e.g. Masanet-Llodra, 2006; Criado-Jimenez et al., 2008) which found that the employment of EMA information is more towards assisting companies' internal decision-making rather than external reporting. Subsequently, this can be seen as another testament that confirms the assertion that a lack of regulation on ER leads to incomprehensiveness and incredibility of ER. In other words, companies are more likely to report information that is more important to their image enhancement rather than being transparent. This bears implications for the credibility of the ER as various users may use the information for decision making.

The results of the present study with the respect to the hypotheses tested are summarised in Table 7.1.

Table 7.1: Summary of Results

Hypotheses	Results
H1: Companies in environmentally sensitive industries are more likely to implement a higher extent of EMA than those in environmentally less sensitive industries.	**Supported**
H2: Company size is positively associated with the extent of EMA implementation.	Not supported
H3: GLCs are more likely to implement a higher extent of EMA than non-GLCs.	Not supported
H4: Companies that have adopted an EMS are more likely to implement a higher extent of EMA than those that have not.	**Supported**
H5: The proportion of NEDs is positively associated with the extent of EMA implementation.	Not supported
H6: Companies in the Commitment phase are more likely to report a greater quantity of ER than those in the Policy and Learning phases	**Supported**
H7: Companies in the Commitment phase are more likely to report a greater quality of ER than those in the Policy and Learning phases.	Not supported

7.2 Theoretical and Practical Contributions

The present study has made significant contributions to the existing body of knowledge in terms of both theory and practice. Each of these contributions is discussed accordingly.

7.2.1 Theoretical Contributions

EMA and ER are both relatively new areas of research. Having been led to the prominence by the departure of social reporting, ER has been the major research interest. Increasingly, it has become apparent that accountability plays a central role in the efforts to minimise business environmental impacts (Gray et al., 2001; Lamberton, 2005;

Hopwood, 2009; Gray, 2010; Hopwood et al., 2010), calling for more research into EMA (Bouma and Van der Veen, 2002; Burritt, 2004; Christ and Burritt, 2013). The present study therefore has contributed to the scant of literature on EMA, especially in the context of developing economic settings. The present study also has contributed to the existing literature on contingency theory and social issue life cycle theory. More specifically, the empirical findings of the present study support the extension of contingency and social issue life cycle research into the field of environmental accounting.

While many ER studies have implicitly suggested that there could be an association between EMA and ER practices, this actually has been empirically examined in the present study. From the theoretical perspective, the employment of social issue life cycle theory to explain such association offers another viewpoint to consider, since prior studies that utilised this theory have focused solely on companies' ER practices. The theory in general suggests that it goes beyond the legitimacy effect in determining companies' ER practices. That is, the commitment of companies towards environmental responsibility may also play a significant role in shaping how they want to be seen by the stakeholders. Despite this however, the present study only confirms the effect of companies' environmental commitment on the quantity of ER.

Lastly, the present study has developed a measure of social issue life cycle phases with reference to the extent of EMA implementation, which has not been used in previous studies. As mentioned earlier, previous studies employing the theory tend to focus on companies' ER, where EMA implementation is rather neglected. As it was a self-developed measure, the procedures undertaken were carefully planned to ensure validity

and reliability. At its simplest, the measurement has offered another view or basis in determining companies' social issue life cycle phases.

7.2.2 Practical Contributions

The results of the present study are also of practical significance for policymakers and companies. In light of the limited presence of accounting in companies' ER practices, the government as well as the accounting professional bodies may wish to consider refining the existing reporting requirements. Such a view has actually been pointed out by the respondents. At present, although companies are obliged to report their CSR activities in the annual report through the CSRR requirement, there is no specific requirement as to how companies should report their environmental information. In addition, the FRS 101 '*Presentation of Financial Statem*ent' and FRS 137 '*Provisions, Contingent Liabilities and Contingent Assets'* only make an explicit reference to ER. Meanwhile, both MFRS 6 (mineral resources) and MFRS 141 (agriculture) concentrate on specific industries, although it is clearly understood that these industries are predominant in Malaysia. For future policy formulation or enhancement of ER practices, the government or policymakers may wish to incorporate the need for companies to report the quantifiable environmental information. This subsequently will promote greater companies' engagement with EMA implementation. To address the uncertainty on EMA implementation, as what has been uttered by the respondents, an EMA framework may well be introduced by the government in collaboration with professional accounting bodies and academics to facilitate the quantification of environmental information. Ideally, the framework should be made with reference to industry, instead of a general guideline as "one size does not fit all". This perhaps has been demonstrated in the present study where companies in environmentally less sensitive industries marked more N/A responses in the TEMA scale than the counterpart.

Thus, in formulating the guideline, the government may want to consider the relevant aspects as regards all industries.

For companies in general, the present study's results provide important insights on the current EMA and ER practices of companies. In today's business world, all aspects of sustainability – social, environment and economy, are becoming more significant. At one point of time, the failure to report quantified environmental information can be seen as a barrier to the stakeholders in making informed economic decisions. Companies may want to consider including relevant environmental information to enhance the reliability and comprehensibility of ER which will help to improve the decision making of the stakeholders. Moreover, in balancing their profit seeking activities with the sensitivity towards the environment, companies need to have firm information regarding their environmental performance. For finance institutions and those providing services, although their business activities may have the least impact on the environment, they can play their role in environmental responsibilities, equally. As such, they can promote environmentally responsible activities through their services, for example, providing fund to those engaging in green technologies, screen loan application according to environmental criteria (i.e. conduct environmental audit and has ISO14001) and promote sustainable activities with clients and suppliers (Mohd Said et al., 2013; Allet, 2014).

Furthermore, based on the discussion, companies may be better informed that they can actually gain profit from being green. It is about time to change the perception that caring for the environment will cost the companies. In the long run, it will benefit the companies in many ways. For instance, apart from an explicit outcome, that is, to maintain or enhance their corporate image, the quantification of environmental

information helps companies to better manage their production activities through the generation of material/resources used and wasted information. Information regarding recycled material or industrial waste may help companies to decide economically on how to reduce the production cost, while selling scrap material may generate extra profits. After all, as previously mentioned, having no indication on the environmental performance, the sensitivity towards the environmental may not necessarily increase. It must to be emphasised here that companies should measure their environmental activities so that they can prudently strategize their targets and have the actual performance be compared with the targets. Accordingly, relevant actions, be it preventive or remedy, can be taken to address any ascended issues.

Apart from the abovementioned parties, the results may also be of significance to the institutions of higher learning. That is, the consideration of including Environmental Accounting as one of the core accounting subjects can be explored. Although at present, accounting students are exposed to environmental costs in Management Accounting subject, environmental accounting in effect covers a broad area. It includes environmental audits and specific environmental accounting procedures. The lack of specific focus on environmental accounting in subject offered by the universities has been highlighted in Deegan's (2013) recent publication. He contends that to ensure a more active role of accountants on accounting for the environment (or sustainability in general), such role should be first nurtured in accounting students. This is to equip students with necessary knowledge which can be practiced when they enter the working environment.

7.3 Research Limitations and Future Research

In spite of the contributions of the present study to the growing body of literature on EMA as well as its link with ER practices, as in any research undertaking, limitations are almost inevitable. Therefore, the results obtained in the present study need to be interpreted in light of certain limitations. The limitations, however, do not negate the findings of the present study.

It is acknowledged that the small sample size is one of the limitations of the present study of which that affects the statistical power of the analysis conducted. Although every attempt has been made to ensure a high response rate, given EMA is relatively new in Malaysia, a low response rate somehow is expected. As a matter of fact, a low response rate has always been a major limitation in accounting research. In addition, all data for the present study were collected at one-point in time rather than longitudinally. This means that the results reflect the situation at a specific time, or in other words, time-specific findings. Thus, any generalisation of the results cannot be made without considerable caution.

The use of self-rating scale in examining the extent of companies' EMA implementation may involve with bias as there is always a possibility for the respondents to make judgment based on his convenience or effort in completing the questionnaire (Cavusgil and Elvey-Kirk, 1998). Moreover, as EMA is relatively emerging, the lack of understanding on the particular issue may also create a concern as it may influence the judgment (Ferreira et al., 2010). In particular, there is a possibility that some respondents were less informed than the average. Instead, to obtain a more nuanced understanding on the subject matter, the qualitative approach such as in-depth interview or case study could be considered in future research. Future research may as

well consider the inclusion of other key personnel from other business functions, such as engineering, marketing and environmental department, apart from the accounting people so as to strengthen the support for the conclusions drawn.

Lastly, the value of R^2 of 0.208 in the ordinal logistic regression analysis suggests that corporate characteristics examined in the present study only explained 20.8% of the variance in the extent of EMA implementation. This means that almost 80% of the factors influencing the extent of EMA implementation have not been captured by the model. While the relatively small sample size might have had an effect on this, future empirical research may wish to include other attributes, such as perceived pressure from the government and the stakeholders. In addition, future research may also examine whether EMA acts as a mediating factor between contingent variables and ER practices.

7.4 Concluding Remarks

The present study began with the Native American proverb that suggests our obsession with economic growth without comprising environmental sustainability will eventually leave us with nothing but our greed. To be realistic, environmental issues related to business activities are here to stay and will continue to grow in parallel with globalisation. In turn, companies really need to be proactive in dealing with their business environmental impacts. In many ways, the implementation of EMA will definitely provide the most relevant aid for companies to manage their environmental performance. Perhaps, it has been mentioned many times in the present study that the implementation of EMA was attributed to the limitation of conventional accounting to capture environmental information (Burritt et al., 2002; Schaltegger et al., 2003; Burritt, 2004). Without having the information about the size and effect of their business activities (Sulaiman and Nik Ahmad, 2006), companies would not be able to effectively

execute their environmental strategies. What is more important, the sensitivity of companies towards the environment may not necessarily improve if there is no clear indication on their environmental performance.

Accordingly, the issue of incomprehensiveness and incredibility of ER will remain if companies, one, do not account for their environmental performance and that no relevant information is generated, and second, hesitate to report their environmental performance due to legitimacy pressures (e.g. to avoid negative public perception). Both issues are equally significant as it will lead to a similar ending – incomprehensiveness of ER. One of the many ways to address these problems is through the introduction of holistic ER and/or EMA guideline. Although CSRR is now mandatory for all Malaysian PLCs, the lack of concentration on the ER standard itself, would inevitably make the reporting processes challenging, as highlighted in the results of the present study.

Overall, if it is not in terms of dollars and cents, being environmentally responsible can create an enormous value to the society as a whole through the creation of better living conditions. To conclude, it is worth to restate what Gray (2010) has mentioned regarding accounting and sustainability,

> …if one was looking to solve the problems of the world one would be unlikely to choose accounting as one's starting point. However, if we are to consider narratives of sustainability at the organisational level, then it is accounts.

The choices we make today will shape the future!

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LIST OF PAPERS PRESENTED AND PUBLICATION

Some sections of this thesis have been presented as conference papers and published in an academic journal.

Conference Paper:

1. Mokhtar, N., Zulkifli, N. and Jusoh, R. "The Implementation of Environmental Management Accounting (EMA) and Environmental Reporting (ER) Practices: A Social Issue Life Cycle Perspective". Presented at the 24th International Congress on Social and Environmental Accounting Research, University of St Andrews, Scotland: September 3rd – 5th, 2012.

2. Mokhtar, N., Zulkifli, N. and Jusoh, R. "The Implementation of Environmental Management Accounting (EMA) and Environmental Reporting (ER) Practices: A Social Issue Life Cycle Perspective". Presented at the Seventh Asia Pacific Interdisciplinary Research in Accounting Conference (APIRA) – Emerging Scholars' Colloquium, Kobe, Japan: July 25th – 28, 2013.

Publication:

Mokhtar, N., Zulkifli, N. and Jusoh, J. (2014). The Implementation of Environmental Management Accounting (EMA) and Environmental Reporting (ER) Practices: A Social Issue Life Cycle Perspective. *International Journal of Management Excellence*, Vol. 4(2), pp. 515-521.

APPENDIX A: Questionnaire Sent to Chief Financial Officer/Head of Finance

SECTION 1: BACKGROUND OF THE COMPANY

Please tick (/) the applicable box and fill in the relevant space.

1. Name of your company *(please specify)* : _____

2. Location of your company:
   - ☐ West Region (West M'sia)
   - ☐ East Region (West M'sia)
   - ☐ Southern Region (West M'sia)
   - ☐ Northern Region (West M'sia)
   - ☐ Sabah / Sarawak (East M'sia)

3. In which sector would you place your ***main*** production activity? *(Please tick **ONE box** only).*
   - ☐ Construction
   - ☐ Consumer Products
   - ☐ Properties
   - ☐ Trading & Services
   - ☐ Industrial Product
   - ☐ Inter-process Communication (IPC)
   - ☐ Real Estate Investment Trusts (REITs)
   - ☐ Plantation
   - ☐ Mining
   - ☐ Technology
   - ☐ Hotels
   - ☐ Finance
   - ☐ Close End Funds
   - ☐ Other *(please specify)* _____

4. Location of your company's head office:
   ☐ Malaysia ☐ Other *(please specify)* _____

5. Your company's controlling stake:
   - ☐ Government-linked company (GLC)
   - ☐ Non-government-linked company (Non-GLC)

SECTION 2: ENVIRONMENTAL MANAGEMENT ACCOUNTING (EMA) SYSTEM

Please tick (/) the level of usage your company makes of the following:

Never **Rarely** **Sometimes** **Often** **Very Often**
1 **2** **3** **4** **5**

7. The inclusion of environmental information within the following management accounting and control systems:

	1	**2**	**3**	**4**	**5**	**N/A***
The costing system	☐	☐	☐	☐	☐	☐
The budgeting system	☐	☐	☐	☐	☐	☐
Capital budgeting and expenditure	☐	☐	☐	☐	☐	☐
Investment appraisal	☐	☐	☐	☐	☐	☐
Performance measurement and appraisal	☐	☐	☐	☐	☐	☐
Internal reporting mechanisms	☐	☐	☐	☐	☐	☐
Risk assessment	☐	☐	☐	☐	☐	☐
Purchasing policy	☐	☐	☐	☐	☐	☐
Plant maintenance	☐	☐	☐	☐	☐	☐

8. The quantification of the following specific environmental issues (i.e. stand-alone environmental accounting procedures):

	1	2	3	4	5	N/A*
Waste, emissions and effluents	☐	☐	☐	☐	☐	☐
Raw materials usage	☐	☐	☐	☐	☐	☐
Energy usage	☐	☐	☐	☐	☐	☐
Recycled materials usage	☐	☐	☐	☐	☐	☐
Returnable packaging/containers	☐	☐	☐	☐	☐	☐
Pollution (i.e. air, water, land)	☐	☐	☐	☐	☐	☐
Land remediation/Accounting for rehabilitation	☐	☐	☐	☐	☐	☐
Environmental contingent liabilities	☐	☐	☐	☐	☐	☐
Life cycle cost analysis in product development	☐	☐	☐	☐	☐	☐
Compliance costs of environmental regulations	☐	☐	☐	☐	☐	☐
Environmental costs in production costs	☐	☐	☐	☐	☐	☐

9. The inclusion of environmental information in the following areas of cost-benefit analysis:

	1	2	3	4	5	N/A*
Energy efficiency	☐	☐	☐	☐	☐	☐
By product use	☐	☐	☐	☐	☐	☐
Recyclable containers/packaging	☐	☐	☐	☐	☐	☐
Waste management	☐	☐	☐	☐	☐	☐
Pollution minimization/prevention	☐	☐	☐	☐	☐	☐
Environmental contingent liabilities	☐	☐	☐	☐	☐	☐
Environmental compliance	☐	☐	☐	☐	☐	☐
Site contamination	☐	☐	☐	☐	☐	☐
Site cleanup	☐	☐	☐	☐	☐	☐

* Not Applicable

SECTION 3: ENVIRONMENTAL DEPARTMENT

Please tick (/) the applicable box and fill in the relevant space.

10. Does your company have an environmental department or personnel (functions) who regularly allocate some time to environmental issues? *(Please tick **ONE box** only)*
    - ☐ We have a separate environmental department, since _____ *(year)*
    - ☐ We do not have environmental department, but there are personnel who regularly allocate some time to environmental issues
    - ☐ We have neither, but there is a specialist/professional (i.e. outsourcing) who manages the company's environmental issues
    - ☐ We have none of the above

Please answer Question 11, if your company has an environmental department. Otherwise, please proceed to **Section 4**.

11. Does the Head of the Environmental Department *(if applicable)* have a position on the main Board of Directors?
    - ☐ Yes ☐ No

SECTION 4: ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

Please tick (/) the applicable box and fill in the relevant space.

12. In relation to your **main business activity**, please **rate the significance** of the following environmental issues to your company:

Insignificant	**Slightly Significant**	**Significant**	**Quite Significant**	**Highly Significant**
1	**2**	**3**	**4**	**5**

	1	**2**	**3**	**4**	**5**
Use of water	☐	☐	☐	☐	☐
Use of energy	☐	☐	☐	☐	☐
Use of non-renewable resources (e.g. coal, petroleum & natural gas)	☐	☐	☐	☐	☐
Use of toxic inputs	☐	☐	☐	☐	☐
Solid waste	☐	☐	☐	☐	☐
Soil contamination	☐	☐	☐	☐	☐
Waste water	☐	☐	☐	☐	☐
Air emissions	☐	☐	☐	☐	☐
Noise pollution	☐	☐	☐	☐	☐
Smell pollution	☐	☐	☐	☐	☐
Landscape damage	☐	☐	☐	☐	☐
Other *(please specify)* _____	☐	☐	☐	☐	☐

13. At this moment, does your company have an Environmental Management System (EMS)?
    ☐ Yes, since _____ *(year)* ☐ In progress ☐ No

    If **YES**, is your EMS certified?
    ☐ Yes ☐ In progress ☐ Considering ☐ No

    Namely: ISO 14001 or other *(please specify)* _____

14. Did your company acquire a quality standard (i.e. ISO 9000 series or similar)?
    ☐ Yes ☐ No

15. Does your company utilise any of the following **environmental audits**?

	Yes	Considering	No
▪ Compliance audit	☐	☐	☐
▪ Environmental Management System (EMS) audit	☐	☐	☐

    Other *(please specify)* _____

SECTION 5: ENVIRONMENTAL REPORTING (ER)

Please tick (/) the applicable box and fill in the relevant space.

16. Does your company disclose environmental information?
    ☐ Yes
    ☐ Considering *(skip Question 17 & 18)*
    ☐ No *(skip Question 17 & 18)*

If **YES**, where do you disclose the environmental information?

☐ Corporate Annual Report
☐ Stand-Alone Environmental Report
☐ Other *(please specify)* _____

17. Does your company have a specific department responsible for preparing the environmental information for reporting purposes?
    ☐ Yes *(please specify)* _____
    ☐ Considering
    ☐ No

18. Does the **Accounting/Finance Department** involve in the preparation of environmental reporting of your company?
    ☐ Yes ☐ No

ANY OTHER COMMENTS

This questionnaire may not be adequate for you to provide your other opinions or perspectives on matters pertaining to Environmental management accounting (EMA) or Environmental Management System (EMS), or its importance with regard to Environmental Reporting (ER) practices. Thus, if you have any other comments on the subject matter, please use the space provided.

THANK YOU FOR TAKING THE TIME TO COMPLETE THIS QUESTIONNAIRE

If you are keen to receive the summary of the research findings, kindly provide your details below or attach your business card:

Name : _____

Position : _____

Address : _____

_____

_____

E-mail : _____

Please Attach Your

Business Card Here

APPENDIX B: The Researcher's Cover Letter Accompanying the Questionnaire

Date: ……..

Dear Sir/Madam,

SURVEY ON THE IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT ACCOUNTING (EMA) SYSTEM IN MALAYSIAN PUBLIC LISTED COMPANIES

I am a postgraduate student at the Faculty of Business and Accountancy, University of Malaya. I am currently conducting a research examining the extent of implementation of Environmental management accounting (EMA) system in Malaysian Public Listed Companies as well as its link with Environmental Reporting (ER) practices.

To ensure the assessment of the association between EMA implementation and ER practices of companies is feasible, kindly provide your company's name in the space provided to allow the researcher to study the company's environmental disclosure in the corporate annual report. Your responses will be kept strictly confidential and used only in combination with others to get a composite picture.

I would be highly appreciated if you could participate in the survey as your participation is crucial in ensuring the research results are representative and meaningful. It will not take more than 10 minutes to answer and I thank you very much for your time.

If you have any queries about the survey, please contact me using any of the following particulars: syahida_m@siswa.um.edu.my or syahida_m@yahoo.com

Look forward to your response. Thank you.

Yours sincerely,

……..
NORSYAHIDA MOKHTAR
PhD Candidate,
Faculty of Business and Accountancy,
University of Malaya.

APPENDIX C: Reminder Letter Sent to Chief Financial Officer/Head of Finance

Date: ……..

Dear Sir/Madam,

SURVEY ON THE IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT ACCOUNTING (EMA) SYSTEM IN MALAYSIAN PUBLIC LISTED COMPANIES

Recently I wrote to you requesting assistance in the completion of a survey questionnaire pertaining to the extent of implementation of Environmental management accounting (EMA) system in Malaysian Public Listed Companies (PLCs). The findings of the research will be of interest to the University of Malaya.

If you have not yet replied, I would be highly appreciated if you could. An additional copy of the questionnaire and self-addressed stamped envelope are attached.

Please disregard this letter if you have replied the questionnaire.

Thank you.

Yours sincerely,

……...
NORSYAHIDA MOKHTAR
PhD Candidate,
Faculty of Business and Accountancy,
University of Malaya.

APPENDIX D: Environmental Disclosure Checklist

(A) Environment

1. General Environmental Considerations

- Statement of the corporation's business operations on environmental pollution pertaining to noise, air, water and visual quality
- Statements indicating that the company's operations are non-polluting or that they are in compliance with pollution/environmental laws and regulations – including recognition of the need to comply with society standards and regulations
- Statement of the capital, operating, and research and development expenditures and activities of the environmental pollution produced by the firm with respect to noise, air, water and visual quality

2. Environmental Policy

- Actual statement of environmental policy
- Statements of formal environmental-related intentions
- Statements indicating that company will undertake certain measure to curb environmental pollution and other such damage or what the company does – including statements indicating that pollution from operations has been or will be reduced

3. Environmental Audit

- Reference to environmental review, scoping, audit, assessment including independent attestation (i.e. external assurance)

4. Environmental – Product and Process-Related

- Waste(s) – including preventing waste, efficiently using material resources in the manufacturing process
- Packaging
- Recycling – using or researching, recycled materials; conservation of natural resources, e.g. recycling glass, metals, oil, water and paper
- Products and product development – i.e. design, Life Cycle Assessment (LCA), disposal policies and environmental impact of product
- Land contamination and mediation – prevention or repair of damage to the environment resulting from processing or natural resources, e.g. land reclamation or reforestation

5. Environmental Financially Related Data

- Reference to financial/economic impact
- Investment and investment appraisal
- Discussion of areas with financial/economic impact
- Discussion of environmental-economic interaction

6. Sustainability

- Any mention of sustainability
- Any mention of sustainable development

7. Environmental Aesthetics

- Designing facilities harmonious with the environment
- Contributions in terms of cash or art/sculptures or plants/flowers to beautify the environment

APPENDIX D: *Continued*

- Restoring historical buildings and structures
- Natural landscaping

8. Environmental – Other

- Undertaking environmental impact studies to monitor the company's impact on the environment – including conducting reviews of performance and employing specialist consultants
- Receiving awards/certifications relating to the company's environmental programmes or policies
- Protection of the environment – e.g. pest control (biological/organic)
- Supporting environmental campaigns – e.g. anti-litter campaign
- Public amenity provision
- Environmental education – including training employees in environmental issues, environmental activities in schools and sponsorship
- Wildlife conservation

(B) Energy

- Conservation of energy in the conduct of business operations
- Using energy more efficiently during the manufacturing process
- Utilising waste materials for energy production
- Disclosing energy savings resulting from product recycling
- Discussing the company's efforts to reduce energy consumption
- Disclosing increased energy efficiency of products
- Research aimed at improving energy efficiency of products
- Receiving an award for an energy conservation program
- Voicing the company's concern about the energy shortage
- Disclosing the company's energy policies

Sources: Williams (1999), Hackston and Milne (1996), Deegan et al. (2002) and Bakhtiar et al. (2009)

APPENDIX E: Environmental Disclosure Index

Report Characteristics	Score	Max. Score
(1) Corporate environmental commitment and strategy		
1. Chairman/CEO statement on environmental commitment/performance in the letter to shareholders	0-1	4
2. Corporate environmental vision/mission	0-1	
3. Corporate environmental policy, values and principles, and/or environmental codes of conduct	0-1	
4. Identification of significant environmental impacts of company's business activities on the environment	0-1	
(2) Environmental initiatives and achievements		13
1. Environmental initiatives to mitigate material environmental impacts of company's products and services in relation to:		
viii. Materials use	0-1	
ix. Energy consumption	0-1	
x. Water use	0-1	
xi. Emissions		
▪ Greenhouse gas emissions	0-1	
▪ Other air emissions	0-1	
xii. Waste	0-1	
xiii. Biodiversity	0-1	
xiv. Noise, visual, odour and radiation	0-1	
2. Specific environmental innovations and/or new green technologies adopted	0-1	
3. Corporate-community involvement (e.g. green/environmental community project) or donations related to environment	0-1	
4. Participation in voluntary environmental initiatives endorsed by the government statutory bodies (e.g. Department of Environment)	0-1	
5. Participation in other environmental organisations and/or association (e.g. industry membership) to improve environmental practices	0-1 0-1	
6. Awards won and/or certifications (e.g. product certification) received related to corporate environmental initiatives		
(3) Environmental governance structure		8
1. There is a department and/or individuals responsible for day to day implementation of environmental strategy and policy	0-1	
2. There is an environmental committee in the board	0-1	
3. Executive compensation is linked to environmental performance	0-1	
4. The implementation of an environmental management system (EMS) (e.g. ISO14001/RSPO) at the plant and/or firm level	0-1	
5. There are formal corporate procedures on environmental contingency planning and environmental risk assessment	0-1	
6. The implementation of internal/periodic environmental assurance/audit	0-1	
7. Employee training program in environmental management and operations	0-1	
8. Terms and conditions applicable to suppliers and/or customers about corporate environmental practices	0-1	

APPENDIX E: *Continued*

Report Characteristics	Score	Max. Score
(4) Environmental compliance		
1. Compliance with environmental statutory requirements and/or standards	0-1	3
2. Prosecutions and complaints received related to environment	0-1	
3. Total amount of fines paid related to non-compliance	0-1	
(5) Environmental performance indicators (EPI)*		
1. Materials:		
a. Material use	0-5	
b. Recycled material	0-5	
2. Energy:		
a. Direct energy consumption	0-5	
b. Indirect energy consumption	0-5	
c. Energy Saving	0-5	
3. Water use:		
a. Water withdrawal	0-5	60
b. Water recycled or reused	0-5	
4. Emissions:		
a. Greenhouse gas emissions	0-5	
b. Other air emissions - NO, SO, and other significant air emissions	0-5	
5. Effluents and Waste		
a. Water discharge	0-5	
b. Waste	0-5	
6. Biodiversity (land, resources use, conservation)	0-5	
(6) Environmental financial data		
1. Amount spent on technologies, research and development (R&D) and/or innovations to enhance corporate environmental performance and/or efficiency	0-1	
2. Summary of savings (in RM) arising from environmental initiatives to the company	0-1	4
3. The integration of environmental information within conventional financial statement (e.g. environmental investments and purpose of investments; contingent liabilities)	0-1	
4. Practice environmental full costing	0-1	
(7) Stakeholder engagement		
1. Basis of identification and selection of major stakeholders	0-1	
2. Stakeholder involvement in setting corporate environmental policies	0-1	3
3. Stakeholder involvement in the environmental disclosure process	0-1	
(8) Report scope and design		
1. Separate environmental section is dedicated in the annual report	0-1	
2. Adoption of GRI Guidelines or other reporting guidelines	0-1	
3. Boundary of report	0-1	5
4. External assurance/verification about environmental information disclosed	0-1	

APPENDIX E: *Continued*

Report Characteristics	Score	Max. Score
5. Communication and feedback mechanism: ▪ name of the person or department responsible with preparing the reports and contact details	0-1	
	TOTAL	**100**

*One point is given for each of the following: there is a performance data on current period; absolute (volume/kilogram/joule/litre/tonne) and/or normalised (ratio – per unit data); trends over time (trend analysis); disaggregate level (plant, business unit and/or geographic segment) and comparative data within sector.

Sources: Sustainability Reporting Guidelines (GRI, 2011), Clarkson et al. (2008), Bakhtiar (2009), Beck et al. (2010) and CSR Framework (developed by Bursa Malaysia).

APPENDIX F: Inter-items Correlations Matrix between Items – TEMA Scale

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1. INC1	1.000																						
2. INC2	.895	1.000																					
3. INC3	.810	.885	1.000																				
4. INC4	.665	.676	.809	1.000																			
5. INC5	.199	.188	.300	.203	1.000																		
6. INC6	.397	.291	.296	.324	.722	1.000																	
7. INC7	.282	.404	.549	.684	.312	.377	1.000																
8. INC8	.529	.616	.561	.526	.344	.302	.589	1.000															
9. INC9	.131	.174	.310	.300	-.017	.066	.344	.165	1.000														
10. STA1	-.229	-.248	-.216	-.155	.052	.223	.055	-.090	.478	1.000													
11. STA2	-.099	-.135	-.106	-.048	-.147	-.070	.149	.217	.523	.662	1.000												
12. STA3	.098	.114	.126	.191	.160	.160	.423	.490	.316	.427	.715	1.000											
13. STA4	-.012	-.122	-.100	.055	.247	.254	.021	.089	.170	.600	.381	.519	1.000										
14. STA5	-.124	-.178	-.180	-.042	-.076	-.092	-.062	-.065	.506	.622	.511	.284	.680	1.000									
15. STA6	-.247	-.243	-.115	-.129	-.003	.169	.084	-.119	.468	.857	.540	.343	.398	.422	1.000								
16. STA7	-.073	-.069	.074	.149	.092	.156	.095	-.135	.426	.674	.412	.192	.433	.577	.683	1.000							
17. STA8	-.132	-.097	.113	.197	.143	.143	.246	-.153	.577	.632	.327	.177	.359	.578	.686	.854	1.000						
18. STA9	-.140	-.157	-.087	-.040	-.085	-.063	-.089	-.186	.567	.665	.456	.222	.484	.738	.681	.787	.795	1.000					
19. STA10	-.076	-.096	.046	.124	-.107	-.050	.326	.085	.483	.615	.716	.497	.269	.432	.603	.455	.445	.401	1.000				
20. STA11	.159	.202	.258	.185	-.174	-.185	.215	.127	.514	.488	.637	.458	.279	.594	.433	.663	.585	.612	.640	1.000			
21. ECA1	.413	.464	.515	.582	.192	.168	.551	.408	.302	.123	.195	.514	.233	.154	.121	.272	.385	.292	.132	.462	1.000		
22. ECA2	.074	.086	.189	.287	.240	.221	.234	.105	.510	.480	.242	.333	.451	.488	.492	.559	.647	.666	.102	.377	.704	1.000	
23. ECA3	-.052	-.038	-.044	.085	-.046	.013	-.012	-.084	.459	.492	.229	.041	.408	.732	.400	.490	.588	.658	.200	.448	.369	.715	1.000
24. ECA4	.109	.139	.199	.255	-.095	-.064	.347	.220	.500	.421	.542	.316	.092	.355	.390	.425	.454	.448	.523	.579	.561	.564	.514
25. ECA5	.162	.215	.357	.412	-.093	-.015	.484	.199	.694	.390	.448	.275	.029	.341	.423	.410	.588	.458	.541	.572	.595	.596	.533
26. ECA6	.229	.300	.364	.442	-.106	.055	.373	.154	.479	.337	.312	.157	-.043	.206	.350	.487	.505	.369	.407	.546	.566	.548	.520
27. ECA7	.063	.158	.243	.349	-.183	-.061	.384	.116	.663	.417	.342	.174	.091	.396	.448	.426	.546	.455	.517	.527	.489	.566	.625
28. ECA8	.140	.271	.296	.425	-.143	-.022	.408	.196	.551	.337	.288	.151	-.006	.287	.292	.381	.452	.387	.370	.475	.545	.573	.566
29. ECA9	.355	.507	.505	.615	.086	.199	.588	.467	.347	.132	.099	.301	.152	.125	.108	.252	.294	.184	.157	.318	.714	.556	.404

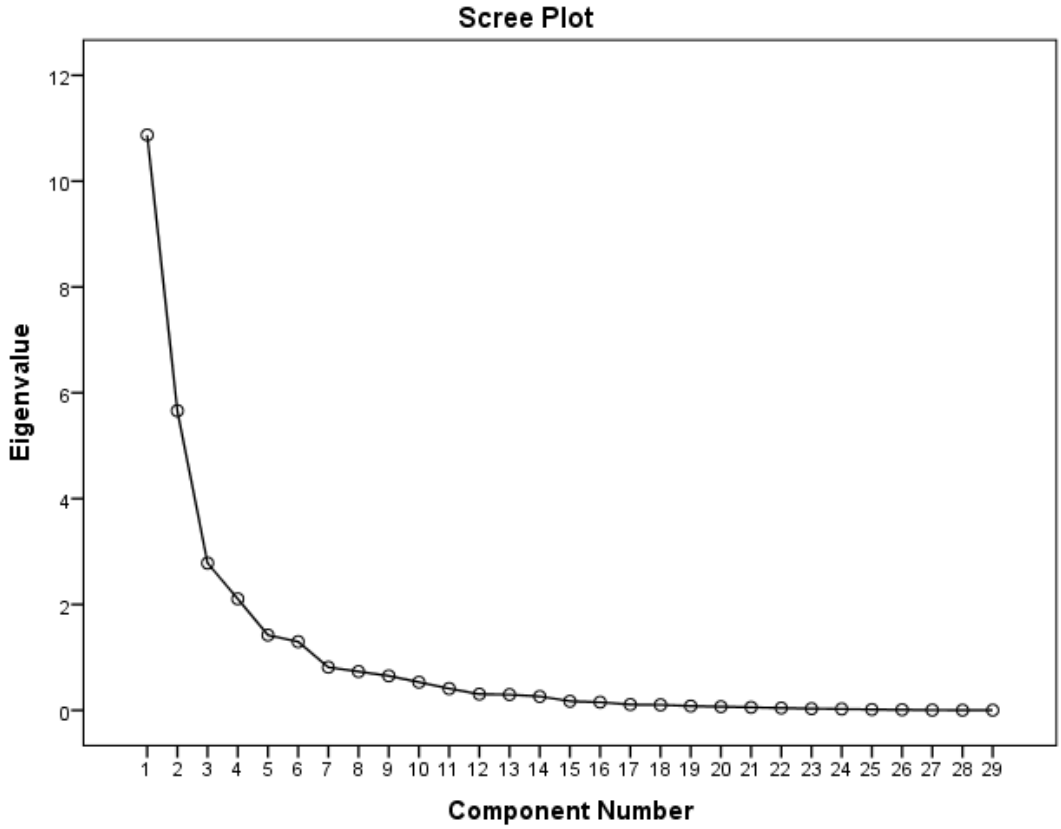
Note: N = 35 (complete cases)

APPENDIX F: ***continued.***

	24	25	26	27	28	29
1. INC1						
2. INC2						
3. INC3						
4. INC4						
5. INC5						
6. INC6						
7. INC7						
8. INC8						
9. INC9						
10. STA1						
11. STA2						
12. STA3						
13. STA4						
14. STA5						
15. STA6						
16. STA7						
17. STA8						
18. STA9						
19. STA10						
20. STA11						
21. ECA1						
22. ECA2						
23. ECA3						
24. ECA4	1.000					
25. ECA5	.882	1.000				
26. ECA6	.790	.846	1.000			
27. ECA7	.746	.846	.836	1.000		
28. ECA8	.723	.813	.904	.893	1.000	
29. ECA9	.544	.630	.752	.711	.828	1.000

Note: N = 35 (complete cases)

APPENDIX G: Scree Plot – TEMA Scale



APPENDIX H: Rotated Component Matrix (Varimax) - All 29 TEMA items

Items		Factor Loadings*		
		1	2	3
Costing system	INC1			**0.769**
Budgeting system	INC2			**0.793**
Capital budgeting and expenditure	INC3			**0.823**
Investment appraisal	INC4			**0.783**
Performance measurement	INC5		-0.429	**0.579**
Internal reporting	INC6			**0.626**
Risk assessment	INC7			**0.695**
Purchasing policy	INC8			**0.773**
Plant maintenance	INC9	0.505	0.505	
Waste, emissions and effluents	STA1	**0.892**		
Raw materials usage	STA2	**0.675**		
Energy usage	STA3	**0.558**		0.411
Recycled material usage	STA4	**0.758**		
Returnable packaging	STA5	**0.760**		
Pollution	STA6	**0.796**		
Land remediation/Accounting for rehabilitation	STA7	**0.756**		
Environmental contingent liabilities	STA8	**0.731**		
Life cycle cost analysis in product development	STA9	**0.782**		
Compliance costs of environmental regulations	STA10	**0.586**		
Environmental costs in production costs	STA11	0.567	0.501	
Energy efficiency	ECA1		0.468	**0.603**
By product use	ECA2	**0.594**	0.412	
Recyclable containers/packaging	ECA3	0.537	0.499	
Waste management	ECA4		**0.747**	
Pollution minimization	ECA5		**0.833**	
Environmental contingent liabilities	ECA6		**0.860**	
Environmental compliance	ECA7		**0.856**	
Site contamination	ECA8		**0.878**	
Site clean-up	ECA9		0.646	0.555
Eigenvalue		10.871	5.660	2.781
Percentage of variance explained		37.49	19.52	9.59

Note: *. Absolute values less than 0.4 were suppressed.

APPENDIX I: Histograms