CHAPTER ONE

INTRODUCTION

1. 1 Introduction

The chapter one began with the background of the study, followed by problem statements as well as the discussion on the research objectives, research questions and definition of some major key terms. Also, this chapter will be discussing on the theoretical, practical and social contribution of this study. Last but not least, an overview of the remaining chapter will be provided at the end of the chapter.

1.2 Background of Study

Every human activity generated waste products and materials. Waste is any material that is considered to be of no further use to the owner and was, hence, discarded. One of the most important principles of waste management philosophies is that most discarded waste can be reused or recycled. Improper waste management will lead to dangerous consequences. Thus, waste should be minimized through proper treatment and procedure (Taylor & Allen, 2006).

The Nations Organization for Industrial Development (2007) defined waste as a heterogeneous mass formed in the result of activities by man or by the other living organisms, in which the waste generated were difficult to be reincorporated into the earth natural cycles.

Solid waste included all semi-solid or solid material originated from industrial, urban areas, mining activities and agricultural was defined as ‘‘material that was a result of transformation, production and utilization processes, which can be treated, reused, recycled or recovered under the technological and economic conditions at that time, specifically for the extraction of its valuable parts’’ (Francisco et al., 2013; pp 583).

Among all solid wastes generated in the world, electronic waste or so called E-waste has been known to be the world fastest growing solid waste streams. E-waste is a term used to cover all items of electrical and electronic equipment (EEE) and its parts that have been discarded by its owner as waste without the intent of re-use (Step Initiative 2014). The use of EEE has been proliferated in the recent years leading to the increasing numbers of discarded electrical and electronic appliances followed by the increased in production and usage (Robinson, 2009; Widmer et al., 2005).

The rapid growing of new technology and design has led to the rapid uptake of information technology, which has caused the early obsolescence of many information technology products. For example, the average lifespan for a new model computer has decreased from four and half years in the year 1992 to half of it which was about two years in the year 2005 and it was further reducing (Widmer et al., 2005). The shorten lifespan of most electronic products, for example, less than two years for computers and mobile phones were the major driver of increasing E-waste problem (Denga et al., 2006; Macauley et al., 2003).

European Commission on Environment (2015) has classified waste from EEE as the fastest growing waste streams in the European Union, these EEE were namely television sets, fridges, computers and mobile phones. There were about 9 million tonnes of E-waste generated in the year 2005 in European Union (EU), which expected to grow to more than 12 million tonnes by the year 2020.

The advent of new technology and design has led to the rapid uptake of information technology, which has caused the early obsolescence of many information technology products.

The most recent study carried out by the United Nations University (UNU) reported as overall of 41.8 million tonnes of E-waste being dumped around the globe in the year 2014 and only about 6.5 million tonnes of the E waste were taken for recycling. The global volumes of E-waste were likely to rise by more than 20 per cent to 50 million tonnes in the year 2018, driven by rising sales and shorter lifetimes of electronic equipment (Balde et al., 2015).

There was a 7.1 million tonnes of E-waste dumped by the United States in the year 2014, followed by 6 million in China, followed by Japan, Germany and India. About 60 per cent of the E-waste was made up of items that included large and small appliances, vacuum cleaners, solar panels, video cameras and electric shavers. While 7 per cent was from the personal computers, printers, cellphones and similar equipment.

Overall, as shown in the Table 1.1, the United Nations University (UNU, 2015) has revealed the significant amount of E-waste generated all over the world from the year 2009. It had given an implication of the high amount of electronic waste generated around the world in which proper actions has to be taken to combat this phenomenon. The UNU (2015) calculated that about 42 Mt (million metric tonnes) of electronic waste was produced globally in 2014, and it was expected to increase to about 44 Mt in the year 2015.

Table 1.1

Evolution of Global E-waste Volumes (Million Metric Tonnes of E-waste)

Continent	Region	2009	2010	2011	2012	2013	2014	2015
Africa	Eastern Africa	0.1	0.1	0.2	0.2	0.2	0.2	0.2
Africa	Middle Africa	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Africa	Nothern Africa	0.5	0.6	0.6	0.7	0.8	0.8	0.9
Africa	Sounthern Africa	0.3	0.3	0.3	0.3	0.4	0.4	0.4
Africa	Western Africa	0.2	0.2	0.3	0.3	0.3	0.3	0.4
Americas	Caribbean	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Americas	Central America	0.9	0.9	1.0	1.0	1.1	1.1	1.2
Americas	Northern America	6.8	7.0	7.3	7.5	7.6	7.8	7.9
Americas	South America	1.9	21.0	2.2	2.4	2.6	2.7	2.9
Asia	Central Asia	0.1	0.1	0.2	0.2	0.2	0.2	0.2
Asia	Eastern Asia	6.4	6.9	7.5	8.2	8.9	9.6	10.4
Asia	South-Eastern Asia	1.2	1.3	1.4	1.5	1.7	1.8	2.0
Asia	Southern Asia	1.7	1.9	2.1	2.3	2.5	2.7	3.0

Asia	Western Asia	1.2	1.3	1.3	1.4	1.5	1.6	1.7
Europe	Eastern Europe	2.0	2.2	2.3	2.4	2.5	2.7	2.8
Europe	Northern Europe	2.1	2.1	2.2	2.3	2.3	2.3	2.4
Europe	Southern Europe	2.3	2.4	2.5	2.6	2.6	2.6	2.7
Europe	Western Europe	3.8	3.9	4.0	4.1	4.1	4.2	4.2
Oceania	Australia & New Zealand	0.5	0.5	0.5	0.5	0.5	0.6	0.6
Oceania	Polynesia, Micronesia and Melanesia	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unit : Million metric tonnes = 1 000 000 00 kg								

Source: Balde, C.P. et al., (2015)

In Malaysia, E- waste discarded from business firms as well as households was estimated to be 688,000 metric tonnes and the number was being forecasted to be up to 1.11 million metric tonnes in the year 2020. These figures did not include the hidden trade of E-waste such as illegal imports from developed countries (Department of Environment (DOE), Malaysia and EX Corporation, Japan, 2008). The exponential growth of E-waste had led to increasing concern about its environmental impacts.

Inappropriate E-waste disposal was harmful to the environment and the population's health. The low level of awareness has contributed the overflow of E-waste produced in Malaysia. Hence, there was a need to urge the E&E industry in Malaysia to volunteer themselves in proper management of E-waste and to provide a rigid reason for them to adapt reverse logistics practices in their operation and hence to improve the overall sustainable business performance in the firm.

The world is currently pressurized by challenges such as global warming, climate change, loss of biodiversity as well as the resources depletion. These on the other hand have demonstrated the imperative for structural change of the economic and societal systems of business nowadays towards achieving sustainability. Since the last two decades, the concept of sustainability has been a growing interest among the policy makers, scientific journals and popular press in various technical fields (Linton et al., 2007). Business sustainability is about corporate or organisational efforts to manage their own and their business network's impact on living things and ecosystems on the Earth. Business sustainability defined as a company's or an organisation's economic, social and environmental efforts to implement and manage both its own and its business network's impact on living things and ecosystems on the Earth (Wagner and Svensson, 2014).

Expectation of stakeholders as well as consumers that a firm should be responsible in demonstrating ethical behaviour and environmental friendliness had been increasing (Ashby et al., 2012). The Earth is the source of everything (Svensson and Wagner, 2012). Debate and theory generation became meaningless and irrelevant if mankind ignored this essential truth. Sustainability activity hence should be the cores for every business in respect the living things and ecosystem on the Earth. It is fundamental for businesses in this century to accept the relationship between man and the natural environment as the underlying values for every business (Svensson & Wagner, 2012).

Corporate social responsibility (CSR) was known as ‘‘a concept whereby companies decide voluntarily to contribute to a better society and a cleaner

environment'' (European Commission, 2001). Addressing sustainability issues in supply chain management have been known to be important and was recognized by more recent academics (Salimifard & Raeesi, 2014; Gobbo et al., 2014; Topcu et al., 2013; Santos et al., 2013, Winter & Knemeyer, 2013; Carter & Rogers, 2008; Krause et al., 2009; Seuring & Müller, 2008; Linton et al., 2007)

The sustainable management of E-waste had increasingly come to the fore in the current era (Robinson, 2009; Widmer et al., 2005). Proper management of E-waste can be great incentives for the firms in this vein. UNU (2015) reported that it was estimated from the discarded materials from E-waste to worth some $52 billion.

The management of E-waste in sustainable way not only can be recovered to alleviate some valuable materials, but also helps to reduce the quantities of hazardous and harmful E-waste generated, and bringing lesser harm to the environment. Therefore, this study further discussed the adaptation level of sustainability practice in E&E firms in Malaysia and thus its effects on this practice towards the overall sustainable business performances.

1.3 Problem Statement

E-waste had become one of the main cause of concern and the major environmental issues due to the dissemination of toxic waste that threats human health and environmental. Problems associated with E-waste were becoming well known in the scientific literatures. In EEE was a complicated assembly of significant number of different materials, many of which were highly toxic. For example, the production of semiconductors, printed circuit boards, disk drives and monitors used in computer

manufacture utilised many hazardous chemicals. Computer Central Processing Unit (CPU) contained heavy metals such as cadmium, lead and mercury. Printed Circuit Boards (PCB) contained heavy metals such as antimony, silver, chromium, zinc, lead, tin and copper.

Lead can affect almost every organ in the body including the nervous system, kidneys and reproductive system. Hexavalent chromium was well known human carcinogens. Cadmium was classified as toxic with a possible risk of irreversible effects on human health. Like lead, cadmium can accumulate in the body over time causing long term damage to human parts. Copper had significant environmental problems during its whole life cycle from extraction to end-of-life disposal (Brigden et al. 2005).

On the other hand, in the waste electrical and electronic products, there were also many valuable elements, such as special and precious metals. Gold and silver are among the precious metals which are rare and possess a high economic value. The UNU report estimated that the E-waste discarded in 2014 contained an some 16,500 kilotons of iron, 1,900 kilotons of copper, and 300 tonnes of gold as well as significant amounts of silver, aluminum, palladium, and other potentially reusable resources, with a combined estimated value of US$52 billion.

Electronic equipment has become the primary consumer of precious and special metals. Thus, there is a need to recover these metals and valuable elements from the E-waste. As raw materials become more expensive and scarce, more investments were being made to reclaim the valuable metals and to treat E-waste

(Cui & Zhang, 2008). Table 1.2 displayed the concentration of metals in common electronic products.

Table 1.2

The Metals Concentrations in EEE

EEE	Silver (ppm)	Gold (ppm)	Copper (% by weight)	Palladium (ppm)
Television (TV) Board	280	20	10%	10
Personal Computer (PC) Board	1000	250	20%	110
Mobile Phone	3500	340	13%	130
Portable Audio Scrap	150	10	21%	4
DVD Player Scrap	115	15	5%	4

Source: Cui & Zhang 2008

The components of a personal computer have the highest economic value, due to gold plated pins, components, transistors and connectors. On the other hand, there was a dropping pattern of the lifespan of most EEE as discussed earlier, in parallel with low recycling rates and high consumerism of these products had increased the E-waste production in recent years (Cobbing, 2008). Nevertheless, per capita used of electronic devices will continue to increase at the global scale, while their size will further reduce more and more everyday objects will be invaded by microprocessors (Hilty et al., 2004; Hilty, 2008).

In fact, most of the E-waste can be remanufactured or recycled to recapture its value by reverse logistic practice. Sustainable supply chain management is fundamental in this highly competitive and dynamic business world, for promoting efficient management and for the firm to improve the competitive advantages (Rao et al., 2006; Andersen & Christensen, 2005).

Reverse logistics practices were important in the management of E-waste. The international regulations, including trade barriers and the work of Basel Action Network (BAN) were motivating manufacturers to acquire reverse logistic approach to mitigate undesired product impacts of E-waste. BAN is an organization which is actively focusing on confronting the economic effects of toxic trade as well as the global environmental injustice and its devastating impacts.

E&E industry is a fast-changing industry where the demand is volatile and the product is shortened. Countries like Korea, Japan, China and Taiwan had introduced regulations related to extended producer responsibility, which made the collecting and recycling used products accountable for producers (Toffel et al., 2008; Lee & Na, 2010). However, in Malaysia, the governance on E&E product take back or recycling of E-waste is just a legislative concept without framework for enforcement.

The products recovery practices were noticeable among Asian countries, and those producers will have to bear the physical and financial obligations in the reverse management of E-waste (Lee & Na, 2010). According to Srividya (2010), through cleaner and greener business conducts, the adoption of product recovery activities of E-waste had enabled firm to exhibit corporate social responsibility.

In United States, product and material recovery activities associated were mainly driven by profit while it is legislation in Europe. In the United States, the product and material recovery were carried out as long as it was profitable to do so, thus it was mainly driven by economic motivator (Spicer & Johnson, 2004). On the

other hand, the European Union (EU), the governmental legislations demanded manufacturers to manage their end-of-life product's disposal and recovery. EU had put into effect that there should be separate product-specific ordinances on E-waste in Europe. Countries such as South Korea and Taiwan also implemented the similar legislations (Walther et al., 2010).

In Malaysia, E&E industry played a leading role in the manufacturing sector whereby it was contributing 26.94% of manufacturing output. Other than that, E&E industry has contributed 32.8% of export and 27.2% of employments as per report by the Malaysian Investment Development Authority, 2013. The sub sectors of these E&E industry in Malaysia were namely electrical product, electronic components, consumer electronics and industrial electronics (MIDA, 2013). The guidelines for the classification of used electrical and electronic equipment in Malaysia (2010) had been issued by the Department of Environment (DOE) of Malaysia to deter E-waste imports and exports. The authorized recyclers must acquire recycling technologies to process E-waste in a cost-efficient manner. Another efforts done by the government of Malaysia in combating the environmental issue was the introduction of International Organization for Standardization (ISO) 14000, 14001 EMS to Malaysia since 1996. Recently, Ministry of Energy, Green Technology and Water began to concern about the sustainable resource consumption (Khor & Zulkifli, 2012). Table 1.3 showed the quantity of E-waste generated by the industrial sector in Malaysia from the year 2009-2012.

Table 1.3:

Quantity of E-waste generated by the industrial sector in Malaysia

Number	Year	Quantity of E-waste (metric tonnes)
1	2009	134,035.70
2	2010	163,339.80
3	2011	152,722.04
4	2012	78,278.05

Source: Ibrahim (2013)

As mentioned earlier, policies and programme has been implemented in some countries to promote waste minimisation and prevent pollution. The Extended Producer Responsibility (EPR) is the most important approach among all. EPR refers to " the extension of responsibility for the environmental impacts of products during their entire life cycle to the producers'' (Harper & Graedel, 2004). The objective of EPR was to make manufactures responsible of the entire product's life-cycle especially when the products become obsolete. The underlying responsibility of this included the financial aspect. Thus, it would be assumed that the company is interested in easier recycling and decomposition of end-of-life products, waste avoidance and pollution prevention through reverse logistic practices, including the re-manufacturing, re-use as well as the efficient recycling (Schwarzer et al., 2009). Extended producer responsibility, however, was not compulsory in Malaysia. There are only some multinational E&E companies adopt independent initiative in collecting end-of-life products for disposal (Agamuthu & Victor, 2011; Tengku-Hamzah, 2011). The few multinational companies (MNCs) operating in Malaysia that do accept equipments through liberal return policy, are namely Dell, Motorola, Nokia, Apple and HP (Agamuthu & Victor, 2011).

It will be a challenge for a Malaysian company to go global as the reverse logistic practices in foreign country was widely adopted by the manufacturing firm out there. For example Europe had introduced WEEE Directive which assigns full responsibility for the manufacturer to recycle household equipment (Khor & Zulkifli, 2012). Thus, Malaysia firms who wish to expand their business globally should acquire reverse logistics practice as part of their logistics management to increase its competitiveness in the global market.

Eltayeb and Zailani (2010) reported that reverse logistics practice in Malaysian firms were relatively low. It was also reported that Malaysian E&E manufacturers were not keen on accepting end of life product returns fit for neither recycling nor disposal due to additional expenditure for handling non-value adding activities. Another study also proved the same scenario (Nik Abdullah, 2011).

Thus, there was a need to raise the awareness of the importance sustainable logistics practices among firms in Malaysia as it could bring more good than harm to the firm as well as to the mother earth. This study thus carried out to fill the gap of the research between the environment commitment of E&E companies in Malaysia and their reverse logistic initiatives which could influence the overall sustainable business performances of the company, in the aspects of operational, environmental as well as economical performance, while the above initiatives will be mediated by the company adherence to the environmental performance improvement, hence to provide a current framework of the relationship between the above mentioned in Malaysian E&E industry. Therefore, this study helped to close the gap towards a true reverse logistics practices in Malaysia E&E industry which could contribute to the

improvement in the sustainable business performance, in the dimension of environmental, operational and economical performances of the firm in Malaysia E&E industry.

1.4 Research Objectives

This study was conducted to investigate the effect of reverse logistics practices towards sustainable business performances in Malaysian E&E industry. The specific objectives of this research include:

(1) To examine the relationship between environmental commitment and reverse logistics practices in E&E industry in Malaysia.

(2) To investigate the influence of reverse logistics practices towards sustainable business performance, namely on the environmental performance, operational performance and economic performance in E&E industry in Malaysia.

(3) To investigate the influence of environmental commitment towards sustainable business performance, namely on the environmental performance, operational performance and economic performance in E&E industry in Malaysia.

(4) To investigate the influence of environmental performance improvement towards sustainable business performance, namely on the environmental performance, operational performance and economic performance in E&E industry in Malaysia.

(5) To examine the effect of environmental commitment and reverse logistics practices on environmental performance improvement in E&E industry in Malaysia.

(6) To examine the effect of operational performance and environmental performance towards economic performance in E&E industry in Malaysia.

(7) To investigate the mediating effect of environmental performance improvements between environmental commitment and reverse logistics practices on the

sustainable business performance in the aspect of economical, operational and environmental in E&E industry in Malaysia.

1.5 Research Questions

There are some possible questions to be answered in this study as below:

(1) Does environmental commitment affect reverse logistics practices in E&E industry in Malaysia?

(2) Does reverse logistics practices affect sustainable business performance, namely on the environmental performance, operational performance and economic performance in E&E industry in Malaysia?

(3) Does environmental commitment affect sustainable business performance, namely on the environmental performance, operational performance and economic performance in E&E industry in Malaysia?

(4) Does environmental performance improvement affect sustainable business performance, namely on the environmental performance, operational performance and economic performance in E&E industry in Malaysia?

(5) Does environmental operational performance and environmental performance affect economic performance in E&E industry in Malaysia?

(6) Does environmental commitment and reverse logistics practices affect environmental performance improvement in E&E industry in Malaysia?

(7) Does environmental performance improvements mediate the relationship between environmental commitment and reverse logistics practices on sustainable business performance in E&E industry in Malaysia, namely in the aspect of economical, operational and environmental?

1.6 Significant of Study

The significant of this study will be discussed based on its theoretical contribution, practical contribution as well as the social contribution.

1.6.1 Theoretical contribution

Since the last two decades, the concept of sustainability had been a growing interest among the policy makers, scientific journals and popular press in various technical fields (Linton et al., 2007). According to previous research, reverse logistics practices in Malaysia E&E firms were not popular (Nik Abdullah et al., 2011). There was no consensus on the effect of reverse logistics practices and sustainable business performance in Malaysian E&E industry. This study therefore concluded that reverse logistics practices will have significant effect towards the sustainable business performance in the company. The development of theoretical framework has been supported by the Natural Resource Based View (NRBV) theory that provided theoretical explanation on the link of environmental commitment to achieve environmental performance improvement and thus improve the competence to achieve sustainable business performance in E&E industry in Malaysia.

1.6.2 Practical contribution

In recent years, public awareness of climate change had been increasing, business and industry were thus expected to have proactive policies and action plans in place. Higgs et al., (2009) reported that even some acknowledged environmental leaders' businesses began found that yesterday's actions were no longer sufficient. The obligations for EEE take-back and recovery was underway or had been enacted. According to Fleischmann, (2000), companies were recognizing opportunities by

focusing on cost savings in production and to access to new market segments, in combination of environmental stewardship together with plain financial benefits.

Increased attentions were paid to the need for recycling and recovery activities among producers in E&E industry. Producers were looking for efficient ways to improve their supply chains by integrating reverse logistics practice, so as from the returned products, the economic value will be recovered (Realff et al. 2000).

In Malaysian E&E industry, however, product recovery activities are not proactive (Nik Abdullah, 2011). Malaysian firms that want to go global were facing a new challenge. This was due to the fact that many countries have already introduced directives or legislation in ensuring the effective disposal of products and its proper management of the product's waste. Moreover, there was an increase in awareness on the issues of sustainability development, environmental improvement as well and the value of corporate citizenship. Also, the increase awareness in the benefit of recycling had placed more pressure on firms on the needs to adopt business initiatives which are more sustainable such as to acquire a greener supply chain strategy.

Thus, this study was intended to prove the true effects of reverse logistics practices towards sustainable business performances and hence provide an option for Malaysian E&E industry to improve its sustainable business performance. This, in turn could provide another way for Malaysia E&E industry to rise the internationally competitiveness.

1.6.3 Social contribution

The issues of global warming, natural resources limitation, climate changes, resources scarcity and energy consumption had been widely discussed. Nowadays, the environmental legislation and society posture had forced companies to really take environmental aspects into consideration in every aspect of their activities, including for a greener supply chain management.

Thus, in fact, the negative environmental impacts can be minimized by incorporate efficient designed and operated reverse logistic practice in the supply chain. Companies thus must be willing to invest in the operation of greener supply chain so that the ecological footprint will be reduced (Barbosa-Povoa et al., 2007).

Improper disposal of E-waste have the potential to increase the pollution of the natural environment and it was significantly hazard to the health among the society. In view of the increasing E-waste production among the globe, the study will create awareness among the E&E industry on the importance of environmental sustainability to make Malaysia as a low carbon economy country which could improve the quality of life.

1.7 Definition of Key Terms

The definitions of key terms of this study are provided below in order to share a common and better understanding on the concepts for further discussion.

Environmental Commitment: A company with a central corporate value of protecting the environment has higher commitment towards the environment. This

company will have a clear policy statement to raise the awareness towards the environmental in every area of the business. This commitment would then resulted in the implementation of a collaborative approach in the development of supply capabilities needed as well as the implementation of green supplier assessment practices, such as the implementation of formal evaluation systems (Fernandez, 2004).

Reverse Logistics : Reverse logistic is the process of planning, implementing, and controlling the cost effective and efficient flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal (Rogers & Tibben-Lembke, 1999).

Environmental Performance Improvement: Environmental performance improvement is an indicator that help organisations to reduce their specific and overall environmental impacts and support external communication and policy-making (Mazzi et al., 2012).

Environmental Performance Outcomes: The effects of green supply chain initiatives on the natural environment towards the overall performance, inside and outside the firm (Rao, 2004; Zhu et al., 2007).

Economic Performance Outcomes: The financial benefits that reflect to the whole organization such as productivity, sales, market share and profitability (Carter et al., 2000; Zhu & Sarkis, 2004; Rao & Holt, 2005).

Operational Performance Outcomes: The benefits that reflect on the operational level of the organization such as flexibility, quality, delivery, and cost reductions (Carter et al., 2000; Rao and Holt, 2005).

1.8 Structure of Remaining Chapter

This dissertation discussed the study on the effect of reverse logistics and environmental commitment on sustainable business performance mediating effect of environmental performance improvement. Chapter one covered the background of the study, followed by the objectives of this study, the research questions, significant of the study and the definition of key terms in this study. Chapter two presented a literature review mainly about the previous studies in reverse logistic, environmental performance improvement, economic performance improvement, operational performance improvement and the measurement of performance improvement. Theoretical framework and hypotheses development are discussed as well. Chapter three consisted of the research methodology used to conduct the study including population and sample, data collection and survey instrument. Chapter four presented the findings and analysis of the study which includes hypotheses testing and chapter five discussed on the study's implication, recommendations and conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Chapter two began with an overview of reverse logistics practices and sustainable business performance. The theory used in this study Natural Resource Based View (NRBV) Theory will be discussed and explained. It was followed by the literature review on the aspect of reverse logistics practices, the hazardous effects of e-waste, management of e-waste through reverse logistics, sustainable business practices, and sustainable business performances measurement. Hypotheses were developed based on the extensive literature reviews in the aspect of environmental commitment and reverse logistics practices, environmental commitment and sustainable business performance; environmental commitment and environmental performance improvement; reverse logistics practices and sustainable business performances; environmental performance and economic performance; operational performance and economic performance; environmental performance improvement and sustainable business performance; environmental performance improvement mediates sustainable business performance. The chapter followed by the discussion on the proposed theoretical framework for this study and a summary of developed hypotheses.

2.2 Overview of Reverse Logistics Practices and Sustainable Business Performance

Environmentally, green issues and sustainability had become the significant issues of discussion among the researchers and academicians. There were an increasing

number of organizations who has implemented reverse logistics practices in order to improve their overall sustainable business performances. E-waste was one of the major environmental pollution contributors and recent statistics had indicated that the total annual global volume of E-waste was estimated to increase up to 42 million metric tonnes soon (UNU, 2015).

In general, the society, businesses, government, and researchers had been hotly debated on environmental issues. Researcher suggested that the environmental sustainability should be made importance as the relationship between the environment and the society has evolved (D'Souza et al., 2007). Firms must therefore, have to be proactive to improve their image in sustainability. One of the important ways was adaption of change their production practices. Firm can achieve environmental improvement through the adaptation of reverse logistics practices. There were an increasing attention on this new way of reverse supply chain management due to marketing, competitiveness, economic reasons, and environmental requirements (Ravi & Shankar, 2005).

2.3 Natural Resource Based View (NRBV) Theory

Natural resource based theory had been supporting this study as this study explained the relationship between reverse logistics practices and the firm's sustainable business performance. Hart (1995) was the earlier theoretical contributor of the resource based view (RBV) theory. NRBV was a theory that derived from the earlier RBV. RBV had argued that the firm's bundle of resources were the determinant for the firm's competitive position rather than a product deployment of those resources

(Wernerfelt, 1995). The heterogeneity and immobility of the firm's resource were the fundamental assumptions of RBV theory.

Barney (1986) argued that in order to be able to achieve sustainable competitive advantages, the firms' strategic resources such as financial, human and organizational resources were not distributed evenly across the competing firms. These streams of resources were not highly transferable. This theory focused on the importance of organizational resources that are rare, inimitable, non-substitutable and valuable.

Hart and Dowell (2011) reported that most of the application of NRBV has been focused on pollution prevention after evaluating the application of the theory of NRBV of the firm as proposed by Hart (1995). Lubin and Esty (2010) indicated that innovations in resource productivity, energy efficiency, pollution control and renewable power drove sustainability efforts in most of the firms.

Ameer and Othman (2012) compared the financial performance of companies that do not engage in sustainable practices against ones with superior sustainable practices found that improving performance on energy use and reducing total emissions generated were among the environmental factors on which the firms were evaluated. Lin (2012) proposed that one of the firm level environmental strategies that range along a continuum of proactiveness would be pollution prevention.

An interesting result reported by Galbreth and Ghosh (2012) linking firm's sustainability and sustainability awareness of its consumers by modeling a duopoly

competition where one firm's product was more sustainable than the other's. Arnold and Hockerts (2011) reported adoption of sustainability reports, integration of stakeholder in environmentally related themes, capturing of sustainability related information, and ISO 14001 certification as some of the important sustainability oriented changes within the firm as revealed in the studies at Royal Philips regarding the corporate sustainability innovation strategy. To sum it up, firms adopting ISO 14000 standards had competitive advantage across the supply chain (Curkovic & Sroufe, 2011).

2.4 Reverse Logistics Practices

Conventionally, forward logistics were the main focus of the most supply chain management studies where raw materials were transformed to finished products and were then delivered to customers. However, there were a change during the recent years as in which most concerns were focused on reverse logistics practices that dealing with the returned end-of-life (Lee & Na, 2010). The end of life products were transferred from end-users to suppliers or manufacturers, these collected products were then be recycled, refurbished or remanufactured (Chan & Chan, 2008; Rogers & Tibben-Lembke, 1999).

Reverse logistics involved the moving of products from their final end-of-life stage to recapture its value or to have a proper disposal management. It was also included the process of remanufacturing and refurbishing. Reverse logistics was more than just recycling the packaging materials or reusing the containers. It included as well the redesign of packages by using less material, or to reduce the pollution generation or the energy consumption from transportation. Reverse