



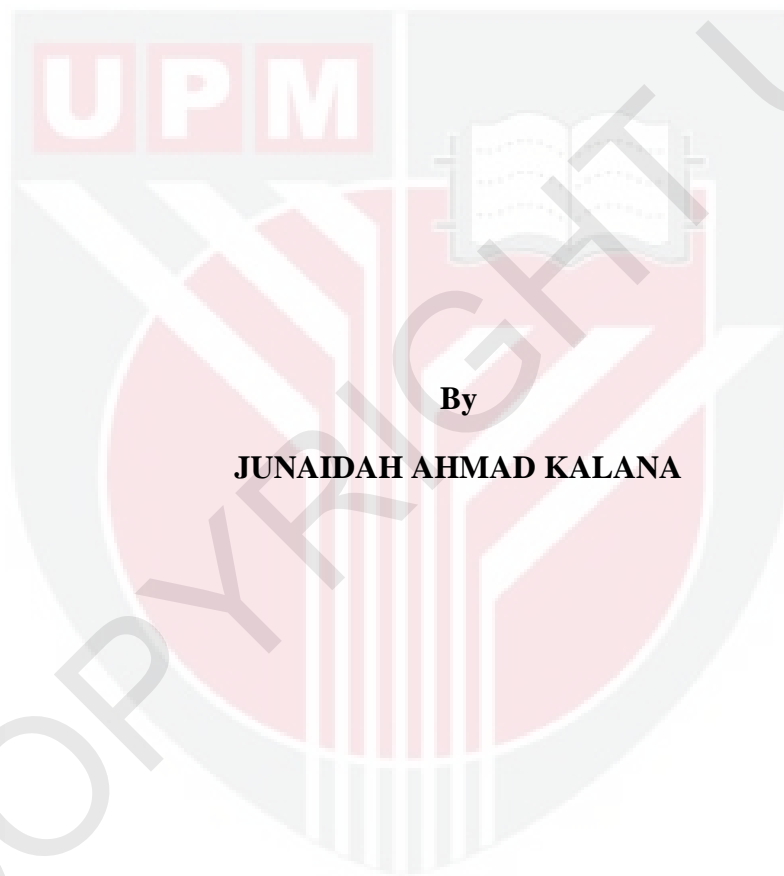
**UNIVERSITI PUTRA MALAYSIA**

***HOUSEHOLD ELECTRICAL AND ELECTRONIC WASTE MANAGEMENT  
PRACTICE EVALUATION IN SHAH ALAM, MALAYSIA***

**JUNAIDAH AHMAD KALANA**

**FPAS 2012 20**

**HOUSEHOLD ELECTRICAL AND ELECTRONIC WASTE  
MANAGEMENT PRACTICE EVALUATION IN SHAH ALAM, MALAYSIA**



**By**

**JUNAIDAH AHMAD KALANA**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,  
in Fulfilment of the Requirements for the Degree of Master of Science**

**August 2012**

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment  
of the requirement for the degree of Master of Science

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**Chair: Assoc. Prof. Mohd Bakri Ishak, PhD**

**Faculty: Faculty of Environmental Studies**

The shorter lifespan of electrical and electronic equipment has contributed to the generation of electrical and electronic waste. From year 2007 to 2010, the total number of electrical and electronic waste that is generated in Shah Alam has increased from 5,323 metric tonnes to 21,205 metric tonnes. The lack of proper facilities for electrical and electronic waste disposal has resulted problem in electrical and electronic waste management from households. Therefore, the main objective of this study is to evaluate the current status of electrical and electronic waste management in Shah Alam. The data for this study derived from two main activities, where the first activity is the collection of secondary data from literature reviews and document searches. Meanwhile, the second activity involved the collection of primary data through survey by using questionnaires. The result of the study shows that the disposal route practice by households in Shah Alam is storage in the house, sold as second-hand electrical and electronic equipment, and disposal with other

solid waste. The major electrical and electronic equipment that contributes to the generation of electrical and electronic waste in Shah Alam is mobile phones and computers. Besides that, the disposal of electrical and electronic waste by households is rely on the electrical and electronic equipment lifespan and the way they handled the appliances before the time of disposal. Even though, the household's knowledge of electrical and electronic waste has evolved, but most of them do not know how to dispose the electrical and electronic waste properly. Hence, this study concluded that electrical and electronic waste management in Shah Alam from households not yet established, and study on the proper electrical and electronic waste disposal is necessary to overcome the negative impact in the future.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains

**PENILAIAN AMALAN PENGURUSAN SISA ELEKTRIKAL DAN  
ELEKTRONIK ISI RUMAH DI SHAH ALAM, MALAYSIA**

Oleh

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**Ogos 2012**

**Pengerusi: Profesor Madya Mohd Bakri Ishak, PhD**

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Jangka hayat yang pendek bagi peralatan elektrik dan elektronik telah menyumbang kepada penghasilan sisa elektrik dan elektronik. Dari tahun 2007 sehingga 2011, jumlah sisa elektrik dan elektronik yang dihasilkan di Shah Alam telah meningkat daripada 5,323 tan metrik kepada 21,205 tan metrik. Kekurangan kemudahan yang sesuai untuk pelupusan sisa elektrik dan elektronik telah menyebabkan masalah dalam pengurusan sisa elektrik dan elektronik daripada isi rumah. Oleh itu, objektif utama kajian ini adalah untuk menilai status semasa pengurusan sisa elektrik dan elektronik di Shah Alam. Data untuk kajian ini diperolehi daripada dua aktiviti utama, di mana aktiviti pertama ialah pengumpulan data sekunder dari tinjauan literatur dan pencarian dokumen. Sementara itu, aktiviti kedua melibatkan pengumpulan data primer melalui kaji selidik dengan menggunakan borang soal selidik. Hasil kajian menunjukkan bahawa amalan pembuangan sisa elektrik dan elektronik oleh isi rumah di Shah Alam adalah penyimpanan di dalam rumah, dijual sebagai peralatan elektrik dan elektronik

terpakai dan pembuangan dengan sisa pepejal yang lain. Peralatan elektrik dan elektronik utama yang menyumbang kepada penghasilan sisa elektrik dan elektronik di Shah Alam adalah telefon bimbit dan komputer. Selain itu, pelupusan sisa elektrik dan elektronik oleh isi rumah adalah bergantung kepada jangka hayat peralatan elektrik dan elektronik, dan cara-cara mereka menangani peralatan tersebut sebelum masa pembuangan. Walaupun pengetahuan isi rumah tentang sisa elektrik dan elektronik telah berkembang tetapi kebanyakan mereka tidak tahu bagaimana untuk melupuskan sisa elektrik dan elektronik dengan betul. Oleh itu, kajian ini merumuskan bahawa sistem pengurusan sisa elektrik dan elektronik untuk isi rumah di Shah Alam masih belum mapan dan kajian mengenai pelupusan yang betul adalah perlu untuk mengatasi kesan negatif pada masa akan datang.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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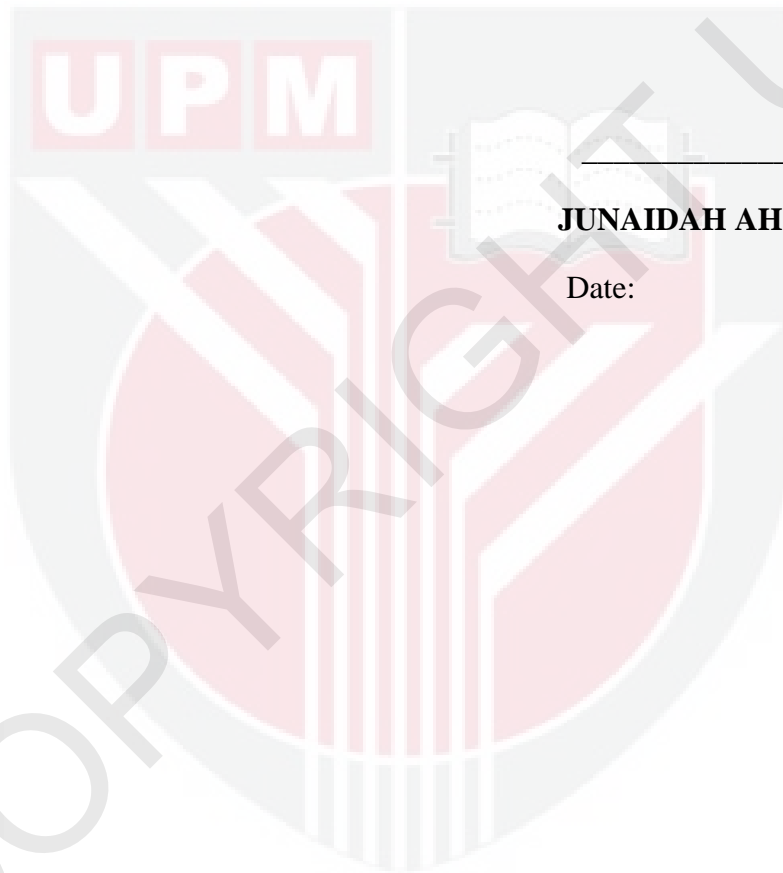
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## DECLARATION

I declare that this my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any degree at Universiti Putra Malaysia or at any other institutions.



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**JUNAIDAH AHMAD KALANA**

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## LIST OF ABBREVIATIONS

E-waste	- Electrical and electronic waste
EEE	- Electrical and electronic equipment
WEEE	- Waste of electrical and electronic equipment
UEEE	- Used electrical and electronic waste
DOE	- Department of Environment
EQSWR	- Environmental Quality of Scheduled Waste Regulation
EQA	- Environmental Quality Act
PGE	- Perunding Good Earth
PEWOG	- Penang Environmental Working Group
EoL	- End of life
Km	- kilometers
Km <sup>2</sup>	- kilometers per square
EPR	- Extended Producer Responsibility
EU	- European Union
UNEP	- United Nation of Environmental Protection
IT	- Information Technology
KICTANet	- Kenya ICT Action Network
MBSA	- Majlis Bandaraya Shah Alam (Shah Alam City Council)
NSWMD	- National Solid Waste Management Department
MT	- Metric tonnes
BPK	- Bangunan Perancangan Kecil
KA	- Kualiti Alam Sdn Bhd
MLHG	- Ministry of Local and Housing Government
DANIDA	- Danish International Development Asisstant
UiTM	- Universiti Teknologi Mara
TV	- Television

EQR	- Environmental Quality Report
NGO	- Non-governmental Organization
CAS	- Civic Amenity Site
PhD	- Doctor of Philosophy



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# CHAPTER 1

## INTRODUCTION

### 1.0 Background of Study

Towards becoming a developed country in 2020, Malaysia has embarked on an industry that supports its economic growth. One of the industries is the manufacturing industries, which produce a variety of products to achieve the goal of becoming one of the countries that advanced in information technology (IT). Electrical and electronic (EE) products in Malaysia have developed and widely ranging from semiconductor devices to consumers and industrial electronic (MIDA, 2004). Table 1.1 shows the classification of EE products used in Malaysia. While encouraging advancement in IT development, in which would enhance economic and social growth, the government has addressed the environmental issues brought about by this advancement. One of the major environmental problems in this 21st century is the production of a new category of waste in the waste stream known as electrical and electronic waste (e-waste).

Electrical and electronic waste or waste of electrical and electronic equipments (WEEE), or e-waste defined as waste that consists of electrical or electronic products. E-waste divided into two types of wastes; white goods or bulky products (washing machines, refrigerators, and microwaves) and brown goods or small appliances (Televisions (TVs), computers, printers). It grouped into different types of products such as the consumer electronics products (CEDs), IT, telecommunication, and large electrical appliances as shown in Table 1.1.

Khetriwal *et al.*, (2007) stated that electrical and electronic equipment (EEE) becomes waste when the product is broken and unwanted by their present owner. This is due to the factors that contribute to the obsolescence of EE products. One of the factors is when the manufacturers continue to update and invent new EEE, which cause the lifespan of the old products to decline. Besides that, the disposal of e-waste assumed to be driven by the consumption of new technologically products where it implies with the growth in global EEE production, which also results in similar generation for e-waste (William, 2005). According to the United Nation of Environmental Protection, e-waste become one of the fastest growing waste issues in the world where it forms 1% of the solid waste on an average in developed countries and expected to grow up to 2% by 2020 (UNEP, 2007). The quantity of e-waste growing significantly in industrialized countries and developing countries is predicted to triple in 2010 (UNEP, 2008), with no exemption for Malaysia.

**Table 1.1. Classification of EE product used in Malaysia**

<b>Classification</b>	<b>Type of electrical and electronic products</b>
Multimedia	TVs, audio stereo, CD players, video, radio, etc.
Telecommunication	Telephone, fax machine, phone, pager
Data processor	Central Processing Unit, monitors, keyboards, speaker, scanner, etc.
Office appliances	Printer, photocopy machine
Domestic appliances	Vacuum, hair dryer, electronic rice cooker, iron, lamp, microwave, etc.

(Source: Othman, 2005)

In Malaysia, the statistic of the total number of e-waste generated annually is unclear. However, it should directly relate with the number of appliances used in this country (IMPAK, 2006). Department of Statistic reported about 46.1 million TVs, 5.6 million refrigerators, 4.9 million washing machines, 93.3 million mobile phones is the main EEE owned by households in Malaysia from 1995 until 2004 (PGE, 2009). Based on these figures, e-waste estimated to increase approximately from 380, 000 to 430, 000 tonnes per year. With the growth of EEE, waste management became the key issue that needs to be immediately resolved where the absence of proper mechanism and standards for disposal that identified as a problem causing e-waste ends up through improper recycling or landfill (Agarwal, 2003).

### **1.1 Problem statement**

Shah Alam is the fast growing and densely populated city in Selangor. It has flourished as urban settlements after the development of Proton car manufacturing plant, which marked the beginning of the city that has experienced a rapid urbanization, and industrialization in the last decade. The Shah Alam City Council administration covers an area of 29, 030 hectares with 465,374 inhabitants (MBSA, 2009). E-waste generated from various sources in Shah Alam, namely from households, individuals, institutions, government or private agencies, commercial sector, electrical and electronic industries, etc. The production of e-waste can be quite high and proper management of e-waste by waste generators in Shah Alam are crucial. From year 2007 to 2010, the total e-waste generated in Shah Alam has increased from 5,323 metric tonnes to 21,025 metric tonnes (Selangor's DOE, 2007-2010).

Therefore, the government had provided facilities to the public to dispose e-waste with collaboration through private initiatives such as recycling centre, e-waste collection program, pick-up services, etc. In 2009, Shah Alam City Council has set up a civic amenity site for bulky waste and recyclable waste, which included the collection of e-waste located in Section 17, Shah Alam. Besides that, the Department of Environment has also enforced e-waste management through the Environmental Quality (Scheduled Wastes) Regulation 2005. In line with the regulation, a full and partial recovery e-waste contractor in Shah Alam was licensed under Selangor's DOE for e-waste recovery purposes.

Even though, the recycling facilities provided are available to all citizens in Shah Alam, but residents living within Section 17 and, the adjacent sections (Section 16, 18 and 24) easily reached it. This has raised an issue in e-waste management practice from households in other areas. It has reported that e-waste together with other wastes in Shah Alam illegally dumped because of the lack of proper disposal facilities and laziness to go to the recycling centre (NSWMD, 2010). Therefore, the lack of proper facilities for e-waste disposal from households has contributed to the generation of e-waste into the waste stream. Furthermore, there were no clear guidelines of proper e-waste management for households although the regulation recognizes e-waste as scheduled waste.

## **1.2 Research Objective**

The general objective of this study is to evaluate the current status of electrical and electronic waste management practice in Shah Alam.

The specific objectives are:

- (i) To identify the e-waste management practices by households in Shah Alam.
- (ii) To examine the household's perception on disposal of e-waste in Shah Alam.
- (iii) To determine the factors that contributes to the generation and disposal of e-waste in Shah Alam.

## **1.3 Significance of Study**

Even though this study carried out in Shah Alam, the results expected to contribute to other city area with the same characteristics with the Shah Alam City Council area of jurisdiction. The finding of the study is significant to help the government, non-governmental organizations (NGOs), and researchers in other institutions in gaining information. It also provides understanding to the interest group to enhance the e-waste management system in Malaysia.

The research will be useful to the decision makers in planning a detailed plan for environmental sound management of e-waste based on situation in the country and other developing countries, in protecting human health and the environment.

Furthermore, it also grants a baseline data on the status of e-waste management practice in Shah Alam by households, for research and concern in the future.

#### **1.4 Scope of the study**

The EEE usage has become the trend among Malaysian households with the ability to provide ease in peoples' daily life. This has raised concerns in e-waste disposal after the devices become obsolete in few years of usage. E-waste management from households has become an issue and preliminary study need to be conducted in order to recognize the practice in e-waste management by households. This is because without a proper treatment and disposal practice in e-waste management, e-waste generation can become a serious issue to the environmental and human health.

Therefore, the main contribution of this study is the evaluation on the current practice of electrical and electronic waste management in Shah Alam. This study conducted in Shah Alam with the focus on e-waste management practice at the household level. The household are the main stakeholders chosen because play two roles in the e-waste lifecycle, where as the EEE holder and e-waste generator. Although, there are numerous household hazardous wastes can be found from household sources, this study only concentrated on e-waste as a whole. Therefore, it is necessary to identify e-waste management in Shah Alam from the aspect of e-waste disposal, e-waste collection, and factor that contributes to e-waste generation, and disposal in Shah Alam for proper management.



## 1.5 Thesis Organization

The thesis begins with Chapter 1 where it introduces the background information about e-waste definitions, sources of e-waste, issues, and e-waste generation. The problem statement and objectives of the study are discussed in this chapter.

Chapter 2 reviews the basic information and background knowledge concerning e-waste definition, sources, effect e-waste to human, and environment, previous studies related practice of e-waste management in other countries and the factors that contribute to e-waste generation. This chapter also discusses the e-waste management with the related regulation and issues of e-waste management in Malaysia context.

Chapter 3 explains the procedure on how the research was conducted and what data was collected and analysed. The methodological approach selected used to achieve the research objectives. The details of the data collection, raw data collected and data analysis activities are discussed throughout this chapter.

Chapter 4 described the result from the analysis from secondary data and survey on e-waste management practice in Shah Alam. The discussion also included the roles and perception of the households in e-waste management. The details on the use of EEE and generation of e-waste discussed together with factors that contribute to the generation of e-waste.

Finally, Chapter 5 concludes the thesis with the conclusions that answered the general objective of the study, as well as giving some recommendation for possible issues in e-waste management study and the further research.



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