

E-Waste Management in Malaysia: Residents' Willingness to Pay for Household E-Waste Recycling in Kuching, Sarawak

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ABSTRACT

'E-waste' refers to electronic and electrical appliances that are no longer beneficial to consumers. An increasing amount of e-waste generated due to an increasing demand for electrical and electronic equipment in line with the rapid growth of the global population has become a growing global concern. Furthermore, limitation of the assimilative capacity of the environment and depleting natural resources have also urged the need to prioritize sustainable household e-waste management. This paper aims to examine the resident's willingness to pay for household e-waste recycling in Kuching, Sarawak. A questionnaire survey was administered among 397 residents living in Kuching. The findings of the study show that majority of the residents in Kuching are not willing to pay for household e-waste recycling of electrical appliances such as fridges (50.6%) and fans (59.4%). However, it also depends on the distinctive types of household electrical appliances they possess. In this study, 10 types of household electrical appliances were selected and the average cost of WTP is expressed based on a percentage of its purchased values of the respective electrical household items listed. It was found that residents from Kuching are only willing to pay an average of 2.3% till 2.6% of recycling fees based on 10 types of the purchased values of their electrical home appliances in this study. This could be explained by the findings that show a low awareness level of sustainable e-waste management practices among the residents in Kuching. Therefore, the study recommends that more environmental education programs are to be carried out in the formal education system to sensitize the residents and children to the risks associated with the importance of household e-waste recycling to promote sustainable household e-waste management, particularly among the growing population in Kuching, Sarawak. Chiam (2013) reported that the residents of Kuching lack knowledge of how to manage their household e-waste and are unaware of the available recycling facilities in the region. However, over time, the e-waste management situation in Kuching has improved, with more recycling facilities being made available to the public for proper disposal of e-waste (Louis, 2020). The Kuching Integrated Waste Management Park, which caters to municipal solid waste and scheduled waste (including e-waste), is claimed to be one of the first integrated waste management parks in Southeast Asia (Trienkens, n. d.).

Keywords: E-waste; Recycling; Sustainable; Willingness to pay; Electronic; Household

INTRODUCTION

Background

The rapid increase in the amount of e-waste generated due to the increased demand for electronic and electrical equipment (EEE) has become a growing global concern. Studies have shown that 53.5 million tons of e-waste were produced worldwide in 2019, with 7.3 kilograms of e-waste generated per capita (Forti et al, 2020). In 1970, the global population was only 3.7 billion, but it has reached more than 7 billion inhabitants in 2016 (World Bank, 2016). It is estimated that the world population will likely exceed 9 billion by 2050, and could potentially reach 11 billion by 2100 (Koop & Van, 2017).

Significant growth in the human population, along with the growing consumption of household electronic

and electrical equipment (EEE), has contributed to the increasing generation of household e-waste. This global concern is exacerbated by the limited assimilation capacity of the environment and the depletion of natural resources. Thus, there is an urgent need to prioritize sustainable e-waste management (SEWM). SEWM is defined as the ability of people to uphold or partake in e-waste recycling activities to reduce the amount of global e-waste generated that would ultimately end up in landfills or exposed to the surrounding environment. According to Wath (2010), sustainable e-waste management (SEWM) plays a pivotal role in developing countries, including Malaysia. Therefore, determining their willingness to pay for household e-waste recycling is crucial to allow policymakers to execute relevant policies regarding household e-waste management in the country.

To practice sustainable e-waste management, people are recommended to recycle their household e-waste products formally in the provided formal e-waste recycling facilities in Malaysia. This would not only save costs in the electronic manufacturing industry due to the scarcity of raw materials but also protects the environment and the well-being of humanity. Improper management of e-waste allows toxic chemical leachates to be exposed to the environment, thereby endangering human health (Utkucan et al., 2010). Hence, sustainable e-waste management as a systematic approach is a must for economic development. The natural resources required for EEE production are facing a decline due to the increasing demand for electronic gadgets, appliances, and equipment (Forti et al., 2020). The raw materials used in EEE production include precious metals such as gold, silver, palladium, and platinum (Prince, 2015). Base metals such as iridium, nickel, rhodium, and copper are also essential materials required in EEE production (Yong et al., 2019). Based on a report provided by Matric Group (2021), a 30% growth in the demand for semiconductors has caused a worldwide shortage of electrical components.

In many developing countries, such as Malaysia, relevant authorities, such as the Department of Environment (DoE), often closely monitor the recycling process of industrial e-waste. The Environmental Quality Act of 1974 governs Malaysia's environmental quality, including industrial E-Waste Management (EWM) in Malaysia. Thus, there is legislative control over industrial e-waste management in Malaysia. It is mandatory for any form of industrial e-waste to be recycled on licensed premises, and its disposal should be conducted in formal registered e-waste recycling facilities (Hamzah et al., 2011). However, the management of household e-waste is often taken lightly and not formally engaged in a systematic process in Malaysia. Unlike the proper procedures for disposing of household e-waste in Singapore with the involvement of their local e-waste collectors (Wong, 2015), Malaysia still lacks an understanding of systematic household e-waste management procedure. Therefore, it is important to study households' willingness to pay for household e-waste management before having relevant institutions take responsibility for managing it more effectively (Hamzah et al., 2011).

There is scanty literature and studies on the e-waste management status in Kuching, as most of the studies related to e-waste management in Malaysia only covered bigger cities such as Penang and Kuala Lumpur. Although Suhaili and Abdullah (2023) have conducted a study on the awareness of household e-waste management among Sarawakians in the state, their study is limited to younger participants who are mostly still pursuing their studies (68.8%). This study aims to fill the research gap on the status of EWM from a larger population sample in Kuching, Sarawak.

E-waste Generation and Management

The world has been witnessing an ongoing accumulation of electronic and electrical waste for the past decade, which has been identified as a pressing socio-environmental issue that necessitates immediate attention (UNEP, 2007). According to Widmer, Oswald-Krapf, Sinha-Khetriwal, Schnellmann, and Böni (2005), e-waste is defined as "a general term that includes various forms of electronic equipment that are no longer valuable to their owners" (p. 439). Furthermore, the EU Directive 2002/96/EC of the European Parliament has provided a list of categories that define e-waste, as shown in Table 1.