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Recycling and reusing electronic waste (E-Waste) as a potential emerging business: a consumer perception.

Extract: The rapid generation of e-Waste in the Sri Lankan urban context has the potential to support the national circular economy. The generation of e-waste is unavoidable in the rapidly developing technology sector. E-waste is typically perceived as a burden. The recycling and reusing of e-waste can positively influence the circular economy. E-waste has the properties such as recyclability and can be used to recover valuable metal components that are depleting rapidly. Comprehensive investigations have been carried out on the public perception of e-waste reusability and its challenges and limitations as a new business model. The study outcomes can help determine how people's (the consumers') perceptions can be effectively assessed to develop a sustainable business model that can be effectively employed to manage e-waste.

Recycling and reusing electronic waste (e-waste) as a potential emerging business: a consumer perception.

The rapid growth of the global economy, the improvements in people's living standards, fast-growing urbanization, and technological innovations in the 21st century resulted in the high consumption rate of electrical and electronic Equipment [1,2]. 53.6 MT of global e-Waste was generated in 2019[2]. Managing e-waste is exceptionally challenging due to the rapidly increasing numbers and the hazardous substances and toxic additives embedded in modern EEE, such as heavy metals and chemicals such as Cadmium, Lead, and Mercury [2]. Retention of most of the toxic yet recoverable and valuable materials in the environment as waste dumps negatively affects human health. Citizens in Sri Lanka are not aware about the proper ways of disposing e-waste. Due to that, the public tends to dispose their e-waste using informal ways without considering their adverse effects. [3]. Most developed countries have formulated effective legislation, established recycling infrastructure, and enforced the principle of extended producer responsibility (EPR) to manage the e-waste [4]. In developing countries, consumers face multiple challenges compared to industrial enterprises because of lack of awareness in handling the waste stream [4]. Thus, improving public awareness plays a vital role in designing a practical framework for e-waste management as an emerging business. To this end, public perception, awareness, and attitudes toward disposal practices of e-waste should be scrutinized [3]. Recently, many countries have also paid serious attention to recycling plants because there is a vast e-waste recycling market worldwide. This growing interest can be utilized to develop the economies of developing countries. That will provide greater scope for addressing the unemployment, earning foreign currency by importing products and increasing per capita income. In the Sri Lankan context too, there exists a potential for achieving sustainable yet significant development by expanding and improving the existing recycling plants.

The current study attempts to appraise the Sri Lankan consumers' perception of e-waste management as a business. The preliminary investigation of this study was carried out through informal interviews and online questionnaires. To this end, online platforms have been employed. Moreover, the interviews and questionnaires were designed in all three languages: Sinhala, Tamil, and English. Also, the informal interviews were conducted in public places. The questionnaires were developed to holistically include four categories: demographics, awareness, behavior, perception, and attitudes. The collected survey data was analyzed using power-BI software.

Majority of the respondents strongly agreed that e-waste can adversely affect human health and the environment as well. There are few amounts of people who do not agree with the adverse effect of e-waste, and it is not a considerable amount compared to the result [Figure 1]. When it comes to the awareness of e-Waste recycling centers, 47% of respondents are not aware and 40% of them don't know about it while 11% of respondents are aware of the e-waste recycling centers nearby [Figure 1]. However, most people do not prefer to take their e-waste to recycling centers due to some circumstances such as not having proper transportation facilities. Thus, building e-waste recycling centers would not be a solution for the proper disposal of e-waste. As per the survey results, the majority of respondents prefer a system where collectors come and carry their e-waste. Thus, e-waste recycling centers should have proper waste-collecting methods.

According to questionnaire results, 10.97% of people transfer their e-waste to recycling centers, and also, most people prefer to repair their broken equipment by a technician to reuse (26.39%).

The third most preferred option is a store at home, at 13.3%. This may happen because some people do not want to throw their equipment or some of them may have space in their houses and it would not be a burden for them. Although people are aware about the adverse effect of e-waste, they would end up throwing broken equipment because it would ultimately become a burden for them

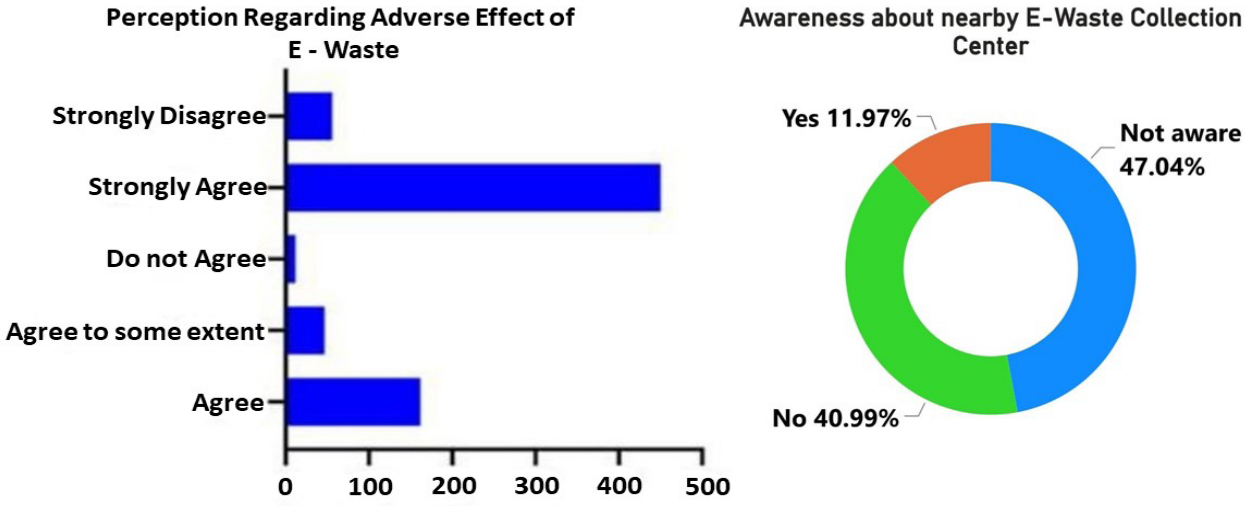

Figure 1: Perception Regarding Adverse Effect of E-Waste & Awareness about nearby E-Waste Collection Centers

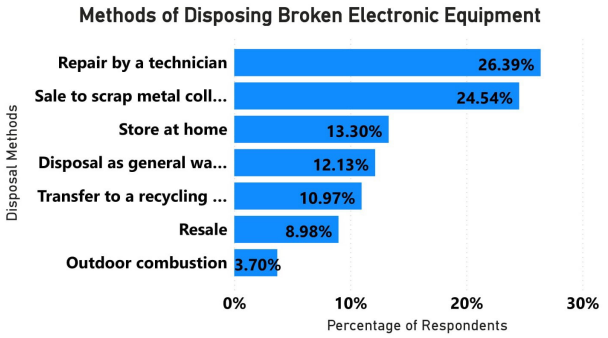

Figure 2: Disposal Methods of Broken Electronic Equipment

and this can happen due to the unawareness of e-waste as well. People prefer selling e-Waste to scrap metal collectors, disposal as general waste, or outdoor combustion [Figure 2]. Overall, those 3 options accounted for 40% even though they cannot be considered as proper disposal of e-Waste because it can worsen the situation.

According to the gathered responses, most of the respondents are willing to pay for an efficient system of recycling e-waste. More than 50% of the respondents have concurred to pay for proper e-waste management practices [Figure 3].

The questionnaire also collected data regarding the perceived durability of some electronic equipment. According to the electronic and electrical equipment categorization, we have selected six pieces of equipment. Air conditioners are categorized under temperature exchange equipment. Most respondents have used air conditioners for more than four years. Laptops also use for more than four years, and it has been categorized as screens and monitors. Mobile phones are categorized as small IT and telecommunication equipment that is mostly used for more than four years. Under small equipment, calculators are also mostly used for more than four or more years, while 22% of respondents use them for only three years. LED bulbs fall under the lamps, which are mostly used for only 1 to 2 years. Among other equipment, 83.4% of respondents have used washing machines for more than four years. Furthermore, it falls under the large equipment. From these responses, it can be concluded that the consumers have perceived the durability of electronic equipment other than the lamps, to be four or more years.

A lower number of respondents believe that the responsibility should be undertaken by the manufacturers. Majority believe that the responsibility of managing, and recycling e-Waste is with consumers. This is followed by another large group of respondents supporting the notion that managing and recycling e-waste should be collectively han-

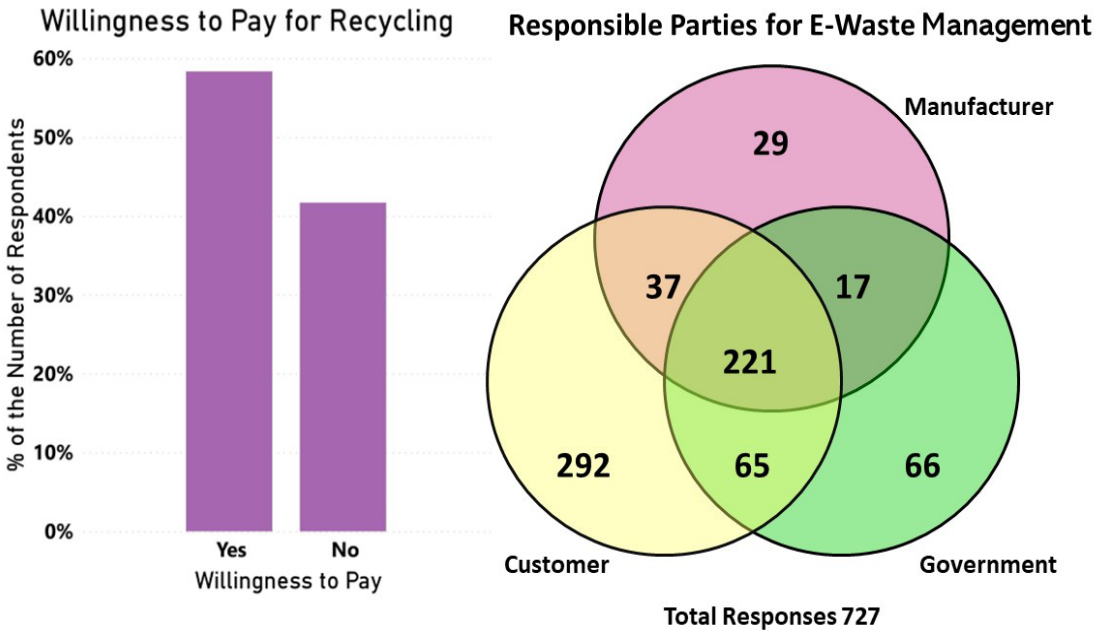

Figure 3: Willingness to Pay for Proper E-Waste Recycling & Responsible Primary Stakeholders for the E-Waste Management

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dled by consumers, the government, and manufacturers [Figure 3]. Thus, implementing an e-waste recycling and management approach that distributes the responsibility between consumers, government and manufacturers will be more effective in Sri Lanka.

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