

ABSTRACT

Indonesia generated approximately 1.9 million tons of electronic waste (e-waste) in 2021, with a growth rate of 39% per year. This figure is expected to rise to 4.4 million tons by 2030. However, according to the National Development Planning Agency (Bappenas), only 17.4% of total e-waste was recycled in 2021, indicating that Indonesia's e-waste management system remains suboptimal. Smartphones are among the most frequently discarded electronic products, with an average lifespan of 3.42 years. By 2028, it is estimated that more than 40 million smartphones will become e-waste in Indonesia.

This study aims to develop an integrated smartphone waste management system using a circular economy approach. The proposed solution seeks to align the roles of key stakeholders, including consumers, manufacturers, collectors, and e-waste processors, to enhance waste management efficiency and reduce environmental impact. By strengthening collaboration among stakeholders, this research supports the implementation of a circular economy, emphasizing reuse, repair, and recycling of smartphone waste components.

The research employs a qualitative method through observation, interviews, and document analysis, with source triangulation to ensure data validity. The study involves 13 key informants, including stakeholders such as consumers, smartphone manufacturers, waste management operators, and government representatives. The research adopts the design thinking methodology, which consists of five stages: empathize, define, ideate, prototype, and test. The empathize stage is conducted through observation and interviews to understand the needs, behaviors, and challenges faced by stakeholders. Next, the define stage formulates the core problem in the smartphone waste management system, which currently lacks effective integration.

The research outcome is a prototype of an e-waste management platform, developed as a service blueprint and high-fidelity platform. The prototype was designed through stakeholder involvement in the ideate stage using brainstorming and SCAMPER methods. It was then validated in the test stage to ensure that the proposed solution effectively meets the needs and addresses the identified problems.

According to the Regulation of the Minister of Environment and Forestry (PermenLHK) No. 75 of 2019, manufacturers are required to contribute to e-waste management through recycling and waste reduction initiatives as part of the Extended Producer Responsibility (EPR) framework. However, the implementation of this regulation remains suboptimal, particularly in the smartphone industry, due to a lack of integrated mechanisms and active stakeholder participation. By strengthening EPR enforcement, the proposed platform is expected to support a more structured smartphone e-waste management system, encourage manufacturers to take a more active role, and enhance consumer and waste processor participation in the circular economy.

Keywords: *Design thinking, circular economy, electronic waste, smartphone, Extended Producer Responsibility (EPR), prototype, platform*