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A Conceptual Framework for Circular Value Chains

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Abstract

Global smartphone sales volumes exceed 1.6 billion units annually, which has caused huge environmental problems. There is an urgent need to advance circularity practices for better reuse, repair, and recycling of smartphones and other electronic products. It is estimated that the annual electronics waste production reaches 75 million tons by 2030, but at present the global recycling rate is only 17%.

European Commission published a Circular Economy Action Plan in 2020 and updated its regulation concerning eco-design in 2022. This means that all industries, including also smartphone manufacturers, must begin to invest in creating new circular products, business models, and supply chains. This evolution will also mean that the number of value chain stakeholders and their requirements will increase in the future. In addition, without a few exceptions, circular product design concepts have not been actively developed yet. There are also various challenges in companies' current business operations including, for example, limited product reuse and recycling processes. Customers and product end-users may also have privacy and security concerns related to recycling.

Digital solutions can address many of those challenges by offering better data, information, tracking, and guidance to customers. This paper presents a conceptual framework for circular value chains including the recommended changes to business models, supply chains, product development, and data management. The framework is tested with a smartphone case example. The aim of the framework is to help researchers and companies develop circular value chains to meet the requirements of evolving regulation and customer preferences.

Keywords: Circular economy, conceptual framework, smartphone, value chain