Accelerated circularity of consumer electronics using Block Chain and Optimized Machine Learning Algorithms

Stanslaus Mwongela
Faculty of Information Technology, Strathmore University, Nairobi, Kenya.

At the heart of our economy lies a linear take, make, dispose model, relying on consuming big amounts of finite products and fossil fuels. The challenge of consumer electronic waste is colossal, and is continuously growing. In 2016 alone, there was a global generation of 44.7 million tons of e-waste, with an estimated raw material value of EUR 55 billion. 435 thousand tonnes of the 44.7 million tonnes were mobile phones. Only 20 percent of e-waste is documented to be collected and recycled under appropriate conditions, whereas the remaining 80 percent is either thrown into the waste stream or dumped, traded or treated under substandard conditions. The consequences of this linear electronics system pose environmental and health impacts both at the production and disposal ends. At the same time, the economic opportunity is significant. Taking smartphones as an example, almost 1.5 billion are shipped every year, with each unit containing components worth over USD 100. This represents a potential USD 150 billion of value that enters the market each year. This value should remain in the system. Even if the materials present in smartphones were recovered through recycling the least valuable loop of a circular economy they could be worth up to USD 11.5 billion. The need to rethink the system is clear, but solutions so far have been limited. The circular economy coupled with the Al opportunity presents a vision and a workable path forwards to meet these challenges, by redesigning our economy to be one that creates rather than extracts value, and keeps the finite technical resources in flow within the economy. The main purpose of this study is to build a Block Chain Circularity Incentive System that facilitates the accelerated circularity of consumer electronics. The main focus being a decision system that processes the block chain data of consumer electronics use and disposal needs to allow circular product and material flows as well as operate circular business models. A formal experimental design is proposed, more specifically, a simple factorial design. As opposed to having one learning algorithm to process electronic products usage on a Big Chain DB, this research proposes to run multiple algorithms and aggregate the results into a single score. The research also proposes to collect primary data from consumer electronics manufacturers, consumers of electronics, and E-waste recovery firms. The primary data would be used to identify the challenges this stake holders face, train the learning algorithms based on consumer electronics use and disposal needs and additionally test the Block Chain Circularity Incentive System developed.

Keywords: Circular Economy; Consumer Electronics Waste; Block-chain; Machine-learning.