Ruth Cherrington
43 Fairphone
Sector focus: Electronics

Rationale

Waste from Electrical and Electronic Equipment is one of the quickest growing waste streams in the world. Globally, 44.7 million tonnes of electronic waste were created in 2016, with mobile phones accounting for 435,000 tonnes. Only 20% of electronic waste is reported as being collected and recycled under suitable conditions, while the remaining 80% is either placed into the residual waste stream, inappropriately discarded (resulting in leakage to the environment), traded or treated in unsuitable conditions. At both the manufacturing and disposal ends, the repercussions of this linear electronics system have an influence on the environment and human health. In the mining and production of items, large amounts of energy and hazardous chemicals are required, and the demand for resources has been connected to hazardous working conditions.

Mobile phone and smartphone technologies are progressing rapidly; the average mobile phone is replaced every 18 months, with consumers likely to keep old models in a drawer at home rather than dispose of them. They contain valuable materials, such as tin, tungsten, tantalum and gold, often referred to as 'conflict minerals' as they are mainly sourced from countries where civil war has been ongoing for decades and groups fight to control mines and trade routes. Valuable materials are contained in such small amounts that they are not yet recycled at industrial levels and only generate interest for their reuse or reclamation of battery materials.

Leadership

In September 2009, a public relations professional and an industrial designer in the Netherlands launched a campaign to raise awareness about the link between smartphones and conflict minerals. They wanted to highlight the issues around mineral exploitation, working closely with the supply chain to ensure fair labour conditions for the workforce. They asked the public to participate in the development of a fair phone free of conflict minerals. They intended that any device that resulted would be a hypothetical concept that would be shown at a local museum. They never intended to bring a phone to market.

The campaign had transformed into a social enterprise by 2013, with the new goal to create a phone that prioritises human values. A crowdfunding appeal was launched to generate income for production of their first model, and surprisingly

customers were willing to pay with little expectation in return, investing in the social aspects and the mission. By the end of the year, they had sold 25,000 non-existent smartphones. The first Fairphone model was released in 2013, and in 2021 they had more than 100,000 Fairphone owners (figure 43.1). The founders and business leaders aim to build a deeper understanding between people and their products, driving conversations about environmental impact and responsibly sourced materials.

Approach

A circular economy for consumer electronics would keep devices in use for as long as possible, either by the original owner or someone who finds new value and use in them. Devices will eventually be passed along to professionals who will restore them properly, reuse or remanufacture the important components within, and separate and recycle the materials.

Modular design is a good way to make it easier to repair, remanufacture and upgrade products. Making it simple to remove only a portion of a product simplifies disassembly, minimising the cost and difficulty of replacing broken components. The modular construction in this case enables the screen to be replaced easily and inexpensively if it is broken. Furthermore, modular systems are easier to customise and adapt to the ever-changing demands of users, avoiding items from becoming outdated and guaranteeing that they are used for a long time. Fairphone also sells spare parts and offers online tutorials to keep phones in use for as long as possible.

Fairphone is transparent about the cost breakdown of the phone, focussing ambitions to create a more responsible economy and declaring only a small profit (if any) from the sales. By supporting the reuse and repair of mobile phones, exploring new electronics recycling possibilities and decreasing electronic waste globally, the business is taking a step closer to a circular economy. The goal is to maximise the usage of resources in consumer electronics, while also supporting recycling programmes to ensure that precious materials are responsibly sourced and their value retained within the system by encouraging reuse.

On reflection

The social enterprise emerged within a challenging industry to provide innovative new products (and later service) to address the social problem arising from the supply chain. As a result, they have used the principles of circular design within the environmental dimension to reduce the impact from technical resource extraction. They have created an entire new business paradigm shift, focussing on a product-to-service shift and therefore retaining the quality of the supply chain throughout.

Dismantling a phone before recycling increases the recovery of metals, particularly valuable metals, as well as the utilisation of polymers for both material recovery and energy generation. Aside from the potential benefits, there are significant product and industry-related constraints in design for recycling. For example, the combinations of metals, compounds, fillers, polymers and functional materials need careful consideration to reduce loss of elements. The complex material combinations in current phones make deconstruction very challenging. Although it is unclear if material recovery and circularity of a complicated product like a smartphone can ever be realised, it is encouraging that these concepts are gaining traction and shows the potential for wider adoption and diffusion. Further study is needed to properly appreciate the advantages of modularity. We know, for example, that the modular design makes these devices easier to deconstruct, but the measurements to evaluate the cost, environmental and social benefit of these phones have yet to be established.

Figure 43.1: Fairphone.
Source: Fairphone.

Sources

https://www.fairphone.com/en/2015/09/09/cost-breakdown-of-the-fairphone-2/
https://www.ellenmacarthurfoundation.org/explore/circular-design