

Case study - The microfactory model: SMaRT innovation for urban waste mining

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Project / Programme	Centre for Sustainable Materials Research and Technology (SMaRT)
Region / Country	Australia
Website	http://www.smart.unsw.edu.au/
Circularity	Microfactory that can transform waste, including e-waste, into valuable products. Has potential to create employment and entrepreneurship in recycling, and to add value to the work of informal recyclers.

Overview

The increasing waste in our daily life is a problem that needs resolution. The recycling of co-mingled and contaminated glass, plastic, wood, marine waste and textiles is needed, both economically and environmentally. So far there has been little work done on dealing with mixed wastes before separation and pre-processing. The Centre for Sustainable Materials Research and Technology (SMaRT), at the University of New South Wales in Sydney, Australia, focuses on tackling this issue. In facing the challenge, it has set up the world's first e-waste microfactory.

About the project

The SMaRT programme was founded in 2008 at the University of New South Wales by ARC Laureate Fellow Scientia Professor Veena Sahajwalla. SMaRT works with industry, global research partners, not-for-profits and local, state and federal governments, on the development of innovative environmental solutions for the world's biggest waste challenges. It focuses on developing novel and innovative technologies and products which reduce environmental impact and enhance community benefits. It is also working to create a platform to enable more engagement, greater immersion opportunities and broader impact for SMaRT centre research

worldwide.

The centre has grown to more than 30 people who collaborate with researchers from the faculties of science, engineering and the built environment.

Developing the microfactory model

SMaRT has developed a microfactory model for turning waste into valuable products, and has created the world's first microfactory for e-waste. It **defines a microfactory** as "one or a series of small machines and devices that uses patented technology to perform one or more functions in the reforming of waste products into new and usable resources."^[1] SMaRT's microfactory is a modular model that can be replicated and set up anywhere where waste is stockpiled. It only needs 50 square metres of space to function.

The microfactory, which is located on the university's campus, has been producing plastic filaments for 3D printing extracted from e-waste. A local spectacle-frame company is a potential first customer if it can show the filaments are robust. The SMaRT team is also prototyping a microfactory that will turn waste textiles, glass and even mattresses into flat construction panels that could be used for heat and sound insulation, and has already attracted commercial interest. SMaRT has also developed a new concept for the processing of complex waste called thermal micronising, which is expected to be transferable well beyond this study. Thermal micronising leverages the gases generated from the waste plastics in complex waste streams such as e-waste, to enable the formation of sub-micron particles for industrial applications, in this case value-added copper-tin (Cu-Sn) nanoparticles.

SMaRT is working with different stakeholders such as Vinyl Council Australia, the Indian Institute of Technology Roorkee, Molycop, Resource Recovery Australia, the Australia New Zealand Recycling Platform and Mobile Muster, among many others. It involves the community by asking for the donation of waste, which it uses in making new products.

The limitation at this point is the small reach of the microfactory model. The reach has to be increased through more awareness raising.

Conclusion

E-waste management is becoming an increasingly important issue to tackle. The focus for now, especially in the global South, has been on increasing the digital reach, but more effort needs to be put into the e-waste that results from this increased access. SMaRT's microfactory model is suitable for a country like India where more than one million poor people are involved in manual recycling operations. It can offer them a chance to become manufacturers, increasing their financial independence.

References and further reading

Centre for Sustainable Materials Research and Technology, University of New South Wales,

Sydney. <https://www.smart.unsw.edu.au>

Mehta, A. (2019, 29 April). Australian university pioneers urban mining 'microfactories'. *Reuters*.
<https://www.reutersevents.com/sustainability/australian-university-pioneers-urban-mining-microfactories>

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Footnotes

[1] Mehta, A. (2019, 29 April). Australian university pioneers urban mining 'microfactories'. *Reuters*.
. <https://www.reutersevents.com/sustainability/australian-university-pioneers-urban-mining-microfactories>

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