# How Blockchain Can Win the War Against Plastic Waste

By Michael Peshkam and David Dubois , INSEAD

**Start-ups are making incremental use of blockchain to reduce plastic waste, but the technology's power to drive real change is yet to be realised.**

It is always difficult for business executives to grasp when a new technology is ripe for use, and blockchain is no exception. This is ironic given blockchain is often presented as the "**technology of trust**".

Blockchains can be thought of as networks of virtual ledgers able to securely store and distribute data without a controlling intermediary. Unlike most digital technologies used to facilitate connectivity and duplicate processes, blockchain can tokenise, securely distribute and transfer anything of value to individuals on the network (such as a person's vote or their financial assets).

The ability to assign and transfer unique value to specific assets has proven particularly useful for helping new markets to emerge (e.g. Bitcoin and Ether) and is now being used to solve some of the most pressing global challenges.

## Plastic packaging: turning waste into an asset

One crucial area in which blockchain may be pivotal in creating change is the growing plastic waste crisis. In 2019, economists estimated the level of plastic waste to be around 6.3 billion metric tonnes (mt) with a value of **US$7.2 trillion**. Around **90.5 percent of plastic ever made has never been recycled**. At this rate, by 2050 we will have amassed roughly **12 billion** mt of plastic waste, enough to outweigh all the fish in the ocean, with an economic loss of more than US$14 trillion. Digital technologies – from social media to apps promoting recycling behaviours and nudging change – have significantly raised public awareness of the challenge. **Litterati**, for example, has created an app to share geolocalised pictures of waste tagged by brand and item type. The app has had many successes including public institutions reportedly switching from plastic to paper packaging after students documented an overload of plastic packaging in their school's vicinity.

Beyond public awareness, a solution to the plastic waste challenge will require both a massive public behavioural shift to stop packaging leaking into the environment, and an increase of resources to change and **accelerate the process of innovation**. Currently, most plastic waste innovation initiatives undertaken by producers, retailers, research institutions, NGOs and waste management are siloed, which limits their impact. They are entrenched in traditional frames of thinking rather than seeking a **systemic shift**.

Such a shift will require a change to the actual and perceived value of plastic packaging so it is seen as an asset rather than junk. Economic, societal and ecological ideals will need to be married and market mechanisms created to assign, transfer and exchange this value. This could take the form of crypto-credits or blockchain tokens. To be truly effective, these credits need to encompass all the ideals mentioned above – like carbon rewards.

## Technological advances in plastic waste management

Technology advances already exist to assist with each step of the plastic waste management process – from asset creation and valuation to transfer and exchange. For instance, to optimise collection and recycling (and reduce poverty around the world), Canadian company **Plastic Bank** has created collection centres in Haiti, the Philippines and Indonesia (additional centres are soon to open in Egypt and Columbia), which buy waste by type and

weight. Participants take their plastic packaging waste to one of Plastic Bank's collection centres and receive credits on their blockchain-based app, using smart contracts accessed from their mobile device.

Another initiative that focuses on transparency in asset valuation and transfer is **Circularise**, a Dutch start-up founded in 2016. Circularise created a blockchain solution that provides an accurate pricing system for any recycled material and can indicate the number of times the product has gone through the recycling process. For example, in textiles and plastics, it transmits info on recycled contents to the brand owners (e.g. Calvin Klein) by leveraging both the Circularise system and a tracer made by a third party.

Many other solutions are likely to emerge to accelerate and promote plastic packaging recycling practices at the company level. One example is **Empower**, a Norwegian start-up that uses blockchain tokens to foster donation-based recycling. For every euro donated by an organisation, Empower commits to clean up the same amount of plastic waste by weight. So, if Nestlé donates €1,000, Empower will collect 1,000 kg (€1/kg) of any Nestlé plastic packaging waste.

But the opportunities that blockchain offers extend even further. The technology's role as an enabler to create and transfer assets means it can connect each item of plastic packaging with the consumer so that it can be treated like an asset with clear monetary, social and ecological value. This could be achieved by adopting technologies such as digital watermarks, RFID, NTFS or IoT, which are currently being used to trace products through the supply chain. Another option could be a QR code printed on the packaging. A simple scan of the code could automatically link information to an app and generate a crypto-credit.

Blockchain also provides the means to create for each item a "material passport" containing valuable information about the packaging features, including the material composition, the proportion of raw vs. recycled plastics, the origins of the material or even the number of times it has been recycled.

### The key lies in adding value to the waste

At present the near-zero value of plastic packaging after use makes any new business model almost impossible. This needs to be urgently revisited. One potential solution could be to borrow from the United Kingdom's **deposit-**

**return scheme model**. This adds a small surcharge to the total price of each product, redeemable when the empty container is returned to the store. In the case of plastic packaging, the consumer would receive a crypto-credit and become accountable for disposing of the packaging in the appropriate container.

Just as microcredits have transformed global development, the simple act of assigning value to packaging and connecting it to consumers through blockchain has the potential to profoundly transform consumer behaviour and entrepreneurial projects in the coming decades.

Keeping in mind the pioneers of technologies, from social media (Facebook) to e-commerce (Amazon) and e-marketplaces (Airbnb), it is clear that there are tremendous opportunities and first-mover advantages to be had by leveraging blockchain in emerging digital markets where asset valuation is under-formalised. Addressing the issue of plastic packaging pollution is no exception. What is needed is a change champion, someone from inside or outside the field who understands the opportunities blockchain presents and has the foresight and resources to use it to bring about sustainable, large-scale change.

*The authors have produced a comprehensive research study, titled "Towards a World Without Plastic Packaging Waste: How to eradicate plastic pollution with digital technologies", for Coca-Cola European Partners, due to be published in 2019 and available upon request.*

*Michael Peshkam has written a more detailed article, titled "**Transforming Plastic Pollution Using Blockchain**: Toward a World Without Single Use Plastic Packaging Waste", published by the Blockchain Research Institute.*

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