



rePATRN
creating social impact
while solving Ghana's
plastic waste problem

START-UP DETAILS

Name: rePATRN Ltd
Website: repatrn.com
Sector(s): Plastics
Established: 2015
Investment-to-date: \$1,050,000
Location: Accra, Ghana
Number of Staff: 8

Key messages

- EIT Climate-KIC start-up rePATRN focuses on recovering the value in Ghana's waste plastic; their business model generates local socio-economic and environmental benefits in addition to climate benefits.
- A large part of waste collection in Ghana is performed by informally employed waste pickers. rePATRN seeks to turn this existing workforce into a network of self-employed formal suppliers.
- rePATRN's business model shows that innovative circular solutions don't have to involve technological disruption – they can be built on existing structures.
- Moving to a circular economy means altering the way we think; waste pickers in Ghana are marginalised because they deal with waste but, by showing that PET is a valuable commodity, rePATRN aims to shift perceptions of waste-picking itself.

Introduction

Ghana is an African economic success story. In 2017 it was one of the fastest-growing economies, according to the World Bank (1). Ghana's capital and largest city, Accra, is expanding fast, but its investment in waste treatment infrastructure has not kept pace with its growth (2). Ghana has a plastic waste problem: in the early 1990s plastics represented about 1% of the country's total solid municipal waste stream but by the mid-2000s this percentage had rapidly increased to approximately 20% (3). According to local estimates, this West African nation now generates approximately 1.7 million tonnes of plastic waste annually, of which just 20% is collected and less

than 2% recycled (4). Moreover, polyethylene accounts for an estimated 70% of the plastic waste in Ghana's solid waste (5). Much of this plastic finds its way into landfill or pollutes waterways and gutters.

Recycling plastics has many benefits: recycling one tonne of plastic saves up to three tonnes of CO₂ equivalent (6) and contributes to reducing demand for virgin material (fossil fuels), incineration and landfill. Developing better recycling infrastructure for plastics is a crucial step towards building a more circular economy (7). The circular economy refers to a restorative economic model, which seeks to extend the life of products, components and materials by keeping these in use within the economy for as long as possible. Circular strategies include, but are not limited to: eco-design, re-use, repair, re-furbishment, remanufacturing, product-service systems and recycling.

Despite the aforementioned benefits, the formal recycling infrastructure in Ghana is still limited. Like in many developing countries, waste pickers perform much of the general work of waste collection with poor pay and working conditions. Ghanaian waste pickers are also socially stigmatised and many belong to vulnerable groups such as migrants, women and the unemployed (8). Here, historically, the materials recovered have largely been sold on to be reprocessed by small-scale waste recycling industries operating outside the formal sector (9). A common issue for waste pickers in Ghana is that they are not paid upon delivery; the buyers to whom they deliver material often promise to pay only once they have sold it on, effectively offloading their business risk onto the waste pickers.

rePATRN, a start-up from EIT Climate-KIC's Swiss accelerator programme, tries to tackle these issues. The start-up was founded by Jeffrey Provencal, who is of Swiss and Ghanaian heritage, and started operations in Accra, Ghana, in 2015. Before launching his start-up, Jeffrey worked in the financial sector in Zurich. rePATRN's objectives are to establish the recycling of plastic bottles in Ghana while empowering informal waste pickers. With a view to scaling-up, in 2017 rePATRN

concluded a two-year pilot, supported by EIT Climate-KIC, exploring whether the value in Ghana's discarded PET bottles could be captured through local recycling. By the end of 2018 rePATRN had secured a total of \$1,050,000 in funding from a variety of public and private sources.

rePATRN's business model

Plastic bottles are predominantly made from polyethylene terephthalate (PET). The recycling process for PET begins with shredding the recovered plastic into small pieces ('flakes') using widely available machinery. The flakes are then cleaned, melted down and processed into pellets that can be reintroduced into the supply chain to create new products. At present, rePATRN only carries out the first stage of PET recycling in Ghana, i.e. the collection of plastic bottles and their conversion into flakes using a shredding machine (see Figure 1).

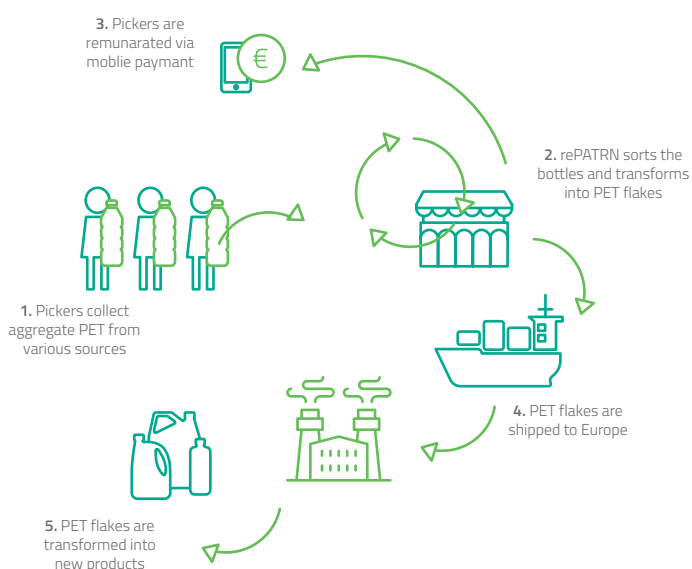


Figure 1: rePATRN's current plastic bottle waste collection and recycling process

Instead of developing a new collection system for this waste, rePATRN pays informal waste pickers to collect plastic bottles. Unlike the norm in the informal sector where buyers only pay waste pickers once they have sold the recovered materials, rePATRN pays its waste pickers on delivery of the material – through mobile phone money services – according to the weight of plastic they have collected.

By the end of their pilot in 2017, rePATRN had collected and shredded a total of 100 tonnes of PET. rePATRN sells the PET flakes at the international market rate to a recycling company in Europe, which processes the flakes into pellets which are then used in a variety of applications including textiles and packaging straps. Based on this current revenue model – and forecasting an increase in collection capacity from 100 tonnes to 8,000 tonnes per annum – the start-up anticipates generating a return on investment within 4-5 years.

Non-local processing of the PET flakes is not optimal environmentally; in order keep the environmental footprint low, rePATRN ships the flakes by sea which has minimal emissions per volume in comparison to freight transportation by road/air. Ultimately, rePATRN's long term aim is to 'close the loop' locally by building a commercial PET recycling plant to process the flakes (see Figure 2).

The local market in Ghana provides good opportunities for scaling up, as considerable demand for recycled pellets already exists. PET bottle manufacturers in Ghana are currently using virgin pellets predominantly imported from Asia, as there are no PET recycling facilities in West Africa that produce food grade pellets. rePATRN believes that a local plant could operate profitably and undercut the price of imported PET pellets by 10%, thanks to the elimination of shipping costs and import duties. rePATRN has already been in contact with local beverage producers who manufacture PET bottles in Ghana to explore whether rePATRN can become a future preferred supplier.

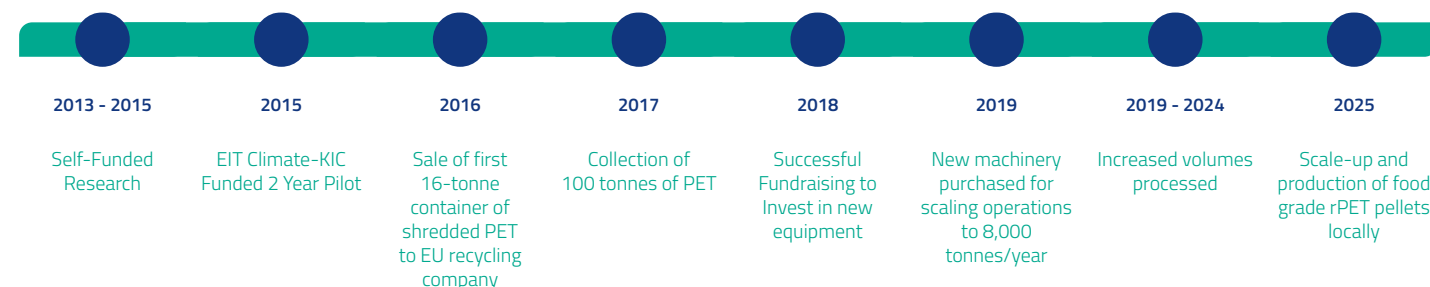


Figure 2: rePATRN's Roadmap to Commercialisation

In order to make such a plant commercially viable, rePATRN estimates it will require a steady supply of 8,000 tonnes of PET bottles per annum and anticipates getting to this capacity over the next couple of years (see Figure 2). The biggest challenge in this process is establishing and maintaining a commercial level of supply in a country with limited formal waste collection infrastructure.

At the beginning of 2019, rePATRN invested in new machinery to facilitate this upscaling. In addition to this equipment, rePATRN's expansion ambitions are centred on formally contracting Ghana's informal waste pickers as suppliers from 2019 onwards. Establishing formal contracts with waste pickers will result in a steady waste-PET supply stream and the workers will receive better pay and, eventually, additional healthcare and social benefits, which should be a very effective supplier recruitment tool.

The social benefits of rePATRN – empowering informal waste pickers as they transition into the formal economy and sharing benefits more equitably – are at the heart of its business model. The driver behind this decision is the company's founder, who strongly feels that he wants to give something back to his country of descent, Ghana. "I have to try and empower as many people as possible," he says. "To be able to send the kids of waste pickers to school, to give them healthcare...". The company's business model gives a perfect example of how circular ideas can bring positive climate and health benefits in addition to tackling important social issues.

System Conditions

With climate change requiring urgent and concerted action, there is a need to reconfigure and transform our economies and societies. Innovative business models alone will not live up to the mark as they are not guaranteed access to market; it is often the surrounding environment that proves decisive on whether an innovation will flourish or perish. This is because the innovation is a part of a wider system and influenced by key system elements, such as: Policy, Skills, Behaviour, Market Structures, Information Flows, Organisational Governance and Finance. Innovation needs to happen on all these fronts ('systems innovation') in order to achieve substantial system transformation.

rePATRN: Enablers

Policy

Ghana has made notable strides in environmental protection. In 2016, for example, the government passed a law that provides for the control, management and disposal of hazardous waste, electrical and electronic waste in the country, and in 2018 a National Plastics Management Policy was in development to curb the country's growing plastic waste problem (10).

According to Provencal, however, it may take some time before such regulations are strictly enforced in Ghana. Still, he believes that establishing a local PET recycling industry could be a catalyst for stronger government policies in this area, such as mandating that Ghanaian PET manufacturers use a certain quota of recycled materials in their products.

Organisational Governance

rePATRN aims to issue its first supplier contracts in 2019. These will, in Provencal's words, turn each waste picker into a self-employed entrepreneur who will be paid according to the amount he or she collects. For now, however, rePATRN is focusing on demonstrating that it is – and will be – a reliable buyer by paying its waste pickers on delivery from the start of their contractual relationship. rePATRN is also currently exploring how to include additional benefits in its contracts, like healthcare and social security.

In addition, the company is exploring how to provide 'productivity bonuses'. In order to implement this, they are looking at using a blockchain-based solution. The use of blockchain will facilitate the creation of a profile of each self-employed supplier and a record of their productivity; this will enable rePATRN to offer incentives based on pickers reaching certain thresholds. This data – verifiable and transparent – will also empower the pickers to hold their buyer to account should any disagreements arise.

rePATRN: Challenges

Information Flows

Despite coming from a Ghanaian background, Provencal says his assumptions about the local environment were confounded from the first day. "Going into business anywhere is difficult, but coming from Europe and starting in Africa, where there are completely different rules ... was probably the biggest challenge for me," he says. An ability to adapt quickly was crucial. For example, rePATRN had to move from two separate locations before finding an appropriate rental site to locate the PET-shredding machinery due to a lack of understanding of local rules about land ownership.



Image 1: rePATRN employees preparing PET for shredding © 2017 Christine Benz

Conclusion and lessons learnt

Moving to a circular economy means altering the way we think about waste, i.e. not as a problem, but as an opportunity. Waste pickers in Ghana are marginalised because they deal with waste but, by showing that the piles of discarded plastic are in fact a valuable commodity, and distributing the value created by recycling activities with its suppliers, rePATRN aims to shift perceptions of waste-picking itself.

The biggest challenge faced by rePATRN was not a lack of either valuable raw material or buyers, but how to link the two in a country with little collection or waste management infrastructure in place. The take-home messages from rePATRN's experience thus far are:

- **Circular innovation doesn't always mean technological disruption.** Rather than develop a new collection system to bring the bottles into their facility, rePATRN has focused on improving the informal waste collection system already in place – to the advantage of both itself and its suppliers.

- **Circular solutions can be designed to deliver social impact.**

A key social benefit of rePATRN's business model innovation is their commitment to share more equitably with their suppliers the value captured from the recycling process.

- **Understanding local culture, regulations and ways of working is key.** Launching a business in an unfamiliar environment can thwart even the best-laid plans. Taking time to understand the culture, regulations and ways of working in your local context can help clarify opportunities and barriers.

rePATRN's business model innovation, which formalises existing informal PET waste collection activities in the country, relies on the transition of individual waste-pickers into incentivised suppliers to meet the annual collection target volume of 8,000 tonnes per year. This will enable the start-up to scale up and justify the longer-term investment in a local commercial recycling facility. rePATRN provides a concrete example of how circular solutions can help tackle the problem of plastic waste and climate change, while also generating social and economic co-benefits.

About

EIT Climate-KIC is Europe's largest public-private partnership addressing climate change through innovation to build a net zero carbon economy. The Climate Innovation Insights are one of the most knowledge sharing prominent formats of EIT Climate-KIC since 2016. Building on innovation endeavours of EIT Climate-KIC start-ups and partner institutions, the Insights are intended to share learnings and provide a platform for reflection and discussion.

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