

The Future of Plastic Waste is Circular: The role a digital app can play in making it happen– a Mozambican perspective

LEARNING BRIEF #5

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Africa RISE (Reform for Investment and Sustainable Economies) is a technical assistance facility funded by the European Union and implemented by a consortium led by Landell Mills, with support from Adam Smith Europe, Imani Development and International Economics Consulting. Its aim is to promote business development and improve the investment climate in eastern Africa, southern Africa and the Indian Ocean in support of inclusive and sustainable growth, job creation and decent work.

This paper provides key insights and learnings from the development and pilot testing of a digital app (Kolekt) for solid waste management in Mozambique, showing how feedback loops helped Topack, the largest recycling company in the country, and Mozambican Association of Recycling (AMOR), an NGO and Mozambique’s leading recycling advocate, adapt the app to bring more value in their supply chains, including for waste pickers. We hope these insights will be considered by recyclers, waste pickers, waste producers, waste aggregators for similar initiatives or in similar contexts.

Africa RISE at a glance

- A four-year programme running until December 2024
- Started in December 2020
- 78 projects funded
- Covers 25 countries in eastern and southern Africa and the Indian Ocean
- Over 150 organisations provided with support
- 55% of investment contributing to the Global Gateway
- 45% of investment improving the Ecosystem for the Global Gateway

“Waste not, want not.” This old saying rings so true today, as global leaders and local communities alike increasingly call for a fix for the so-called “throwaway culture.” But beyond individuals and households, waste also represents a broader challenge that affects human health and livelihoods, the environment, and prosperity. Today we produce as many tonnes of plastics, every year, as the combined weight of all human beings on earth. The challenge is to stem the production of these 400 million tonnes of plastics and route the post-consumer plastics to sound destinations, such as recycling.

Mozambique generates nearly 700,000 tonnes of plastic waste each year but only 1.5% of that is recycled. The proportion is even lower in rural areas due to a lack of collection facilities. Waste is often burned or dumped on vacant land, and into rivers, lakes and ocean. Meanwhile, over 130,000 catadores (the Portuguese word for informal waste picker or “scavenger”) collect any recyclables such as metals, cardboard, glass and plastics. “The Industry needs to have access to waste before it reaches rubbish bins and landfills, to ensure cleaner material that will increase recycling rates and reduce costs”. said Tiago Cepeda the Director of recycling at Topack, explaining that this help reduce the cost of the process for the recycler but also impact positively on the environment.

To help informal waste collectors do their jobs and receive better payment, several apps have sprung up around the world linking them directly to customers and redrawing negative stereotypes prevalent to the waste sector.

Mozambican Association of Recycling (AMOR), an NGO and Mozambique’s leading recycling advocate, approached EU Africa RISE in early 2023 to request support to pilot the digital waste app Kolekt in Mozambique, and support a circular economy of plastics in the country. Africa RISE had several on-going or completed initiatives in circular economy already, including in Mozambique, but this was a quite unique project as it would have a direct and immediate effect on the plastics value chain.

The app was planned to be piloted with businesses, waste pickers, recyclers.

The Kolekt waste management app is a bit like “Uber-for-waste”, it makes it easy for people to announce or advertise that they have recyclables to be picked up, at restaurants for example. This makes it easier for waste pickers to know where to go, and at what price they can pick up the valuables. Similarly, recyclers or exporters of recyclable materials can advertise that they want to buy recyclables, at what price and at which location.

Making demand and supply visible is the first step in creating a circular economy.

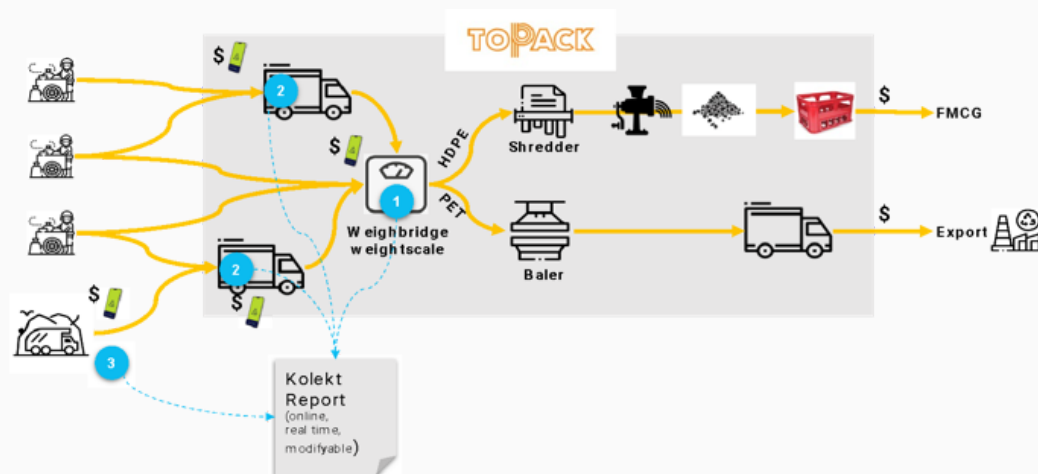
The project kicked off in March 2023, with a eight-month implementation period. The pilot started immediately after that, first with a recycler Topack, the only end-to-end plastic recycler in Mozambique. With the Kolekt app they sought to identify the sources of HDPE, PP and PET plastics, and the collectors. They also wanted to better monitor the buying of plastics and cash management by their truck drivers.

Topack was founded in 1995 in Maputo, Mozambique and is the largest recycling company in the country and across Lusophone Africa with operations in Angola and joint ventures in Latin America and Europe. They recycle an average of 10,000 kilos of PP and PE plastic waste per day in Mozambique. Digitising Topack’s existing supply chain will show how critical support to informal waste collectors is in Mozambique’s overall waste management ecosystem.

“I am so convinced by an app like Kolekt for the circular economy, that I have hired a team of 5 staff to roll out the app.”

AMOR’s Founder, Stephane Temperman

Fig. 1 Topack plastics waste app business model



Digital app key milestones:

- March-April: Inception
- May- October: Pilot in Moz
- July-August: Pilot review mid-way
- August-Oct: Adjustments
- Nov 2023: this learning brief

The pilot started with the training of Topack’s staff who receive the deliveries of recyclable material, then the drivers of Topack’s recycling collection trucks and those of partner recycling collection agencies. The vehicles use Kolekt to register their purchases, and Topack use it for their own purchase of this material.

AMOR also piloted the app, at an existing Eco Point in Maputo that uses municipal land. It is AMOR’s first Eco Point, now run under the microenterprise RLR. It includes a 20-foot container for storing materials, scales, and a tricycle that pulls a large basket for picking up materials. The Eco-Point first used Kolekt to register their current stock. They then used the app to register all purchases and sales of recyclable materials, a system currently being tracked on paper. Kolekt makes it easier for them to track their inventory and register their clients (suppliers).

Mid way through the project, Africa RISE conducted an assessment of the pilot, in July 2023. It partnered with 60 Decibels (60dB), a tech-enabled impact measurement company, to gather data. 50 users with SmartPhones from 423 list of users were selected.

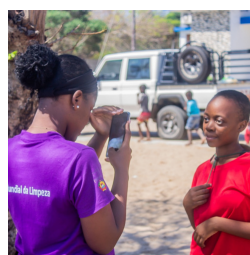
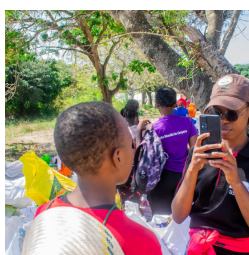
Africa RISE worked with AMOR and Topack to identify which aspects they would want to check, co-created questions together and used a non-intrusive, Interactive Voice Response (IVR) system to deliver them to app users’ phones.

These were 10 simple but critical questions, translated into Portuguese that could be answered at app users’ own pace and in their own time.

Results were enlightening and were used by Topack and AMOR to take actions and improve on the app business model.



This paper presents key insights from this assessment and how these findings could be considered by other stakeholders from the waste management sector, for similar needs or in similar contexts.



1. The app has proven effective to market players by “leaving no one behind”

When properly supported and organised, informal recycling can create employment, improve local industry competitiveness, reduce poverty and reduce municipality spending. But the reality for more than 20 million informal waste pickers in the world – typically women, children, the elderly, the unemployed, or migrants – remains one with unhealthy conditions, a lack of social security or health insurance, and persisting social stigma.

Successful interventions such as this app can improve waste pickers’ livelihoods, include formalising and integrating waste pickers into the economy, strengthening the recycling value chain, and creating more value.

The Kolekt app was designed together with waste pickers in Indonesia. During many sessions, with lot of coffee and cigarettes, the app was criticized and redesigned. Eventually it was built to support unbanked waste pickers with no phone at all. Using face recognition, and a simple cash-out points system, the unbanked and undigitised citizens were enabled to earn money with the app.

So far over EUR 73,000 has been generated for waste pickers from transacting through the app, a more secure, reliable and trustworthy system for the most vulnerable people from the plastics value chain.

The app is working well for informal collectors that have a simple feature phone or even no phone at all. This allows them to receive bonus points, trade, and log in to cash out their points using face recognition with the app installed on someone else’s smartphone. “We need to make technology work for the poor because they asked us to, and the waste pickers in Indonesia helped us design it”, reflects the developer.

Number of users is steadily increasing from 10 users in May 2023 to 423 users in July and over 1,800 users at the end of October 2023.

Since its launch in Mozambique in May 2023 over 5,400 transactions and more than 380 tonnes of plastic waste[1] have been collected and traded through the app in three regions of the country. Income for waste pickers has also been generated.

The app has made the job for waste pickers easier because they no longer need to “hunt” around town for waste like they used to. “I just have to take the already sorted waste to agreed Topack or EcoPoint locations, saving time and fuel” (waste picker, Topack Maputo collection point), adding that he now earns at least EUR 100 per month, more than the minimum wage in Maputo, unlike before when his income was lower and uncertain.

What have we heard from listening.....

What benefit, if any, do you see from using this app?

“For me it was easy to use the application because it makes it easier to sell to buyers of the waste”. (Female user, at Topack, Maputo)

“The app, it has been very good, it registers everything beautifully and accurately, we love working with it.” (Male user, Beira)

“The advantages are it helps in what is purchase by the collectors (Female, just testing the app, RLR-Amor, Maputo)



[1] Statistics from May 2nd till Monday October 30

2. A focus on data, feedback and action can drive business performance

Despite millions of tons of plastic going to waste each year, we have a distinct lack of quality recycled plastic stock on the global market. An app offers smart tools for every link in the plastics value chain.

With the app Topack sought to identify the source of their HDPE and PP plastics, and also wanted to know where their collectors pick the plastic. Enabled with GPS tracking, and having every transaction photographed and digitally confirmed by the seller and the buyer, the app has allowed Topack to better monitor the buying (and undervalue buying) of plastics by their truck drivers. They also hoped to control the quality of the plastic, build a more reliable supply chain and overall improve their business model.

Understanding how much and where waste is generated – as well as the types of waste being generated – allowed Topack to realistically plan, assess relevant technologies, and consider strategic market players for waste provision, such as the waste pickers or aggregators.

Over 380 tonnes of recyclables, averaging 70 kg and EUR 13 per transaction, have been traded through the app. Mozambique's two main users are Topack and AMOR.

Over the past six months Topack has made over 4,800 transactions and has gained over 1,500 users. These are actors throughout the Topack recycling supply chain, 90% are informal waste pickers, and approximately 80% are women.

Useful app features for Topack

- Company-focused reports allowing the company to see who its suppliers are, where the materials come from, what their average buying price is, and which employees are buying most and at which price.
- Paid collection service transactions for providers offering a segregated waste pick-up service.
- Stock control allowing Topack to check their stock levels in the app of 10 different materials and correct them to reflect their real stock.

Over the same period AMOR has made 600 transactions at its 4 EcoPoint buying centers. It has registered 600 new sellers of which the most are also informal collectors, mainly women.

These market players, e.g., informal waste pickers, or Topack, the recycler assisted also with the app design improvements to better fit the Mozambican context and needs of the users, by having it tested, then assessing it in real-world environments. The assessment took place mid-way, in July 2023, not too early, but also not too late during the pilot period, in order to allow time for Topack and the developer to respond to findings. It provided Topack with information to take decisions.



What has been learnt from 60dB survey?

- The app has been successful in offering a user-friendly registration process and an easy-to-use interface. More than half are likely to use the app again in the future.
- 9 in 10 respondents found the registration process with the app to be easy, reflecting a smooth onboarding experience for most users. Additionally, 84% of respondents reported that using the app was easy, indicating an intuitive user interface and user-friendly design.
- Overall, 44% of respondents said they were 'satisfied' with the app, 24% were dissatisfied'. This mix view of satisfaction rates was also reflected in likelihood to recommend: 41% said they were likely to recommend to friends and family, with 40% saying they were unlikely to do that.
- 56% of users expressed an inclination to use the app again in the future. This reflects a level of engagement and interest that can be further nurtured to retain existing users.

The importance of listening

To create value, it requires a company to gain visibility of its suppliers, as well as its customers; this often comes from simple things, like 'listening'.

Africa RISE and 60dB mid-way assessment helped Topack act and improve the app, which factored positively on its business model, and ultimately its bottom line. ...

While still creating value, Topack ensured that this value is distributed across its supply chain.

[2] Adapted from 60dB report (August 2023)

What actions have been taken as a result?

- Digging deeper into the reasons behind dissatisfaction helped Topack work with developer and make adjustments to the app to continue using it.
- Understanding why 20% of the users were dissatisfied and 41% said they were unlikely to recommend the app, helped Topack and the developer design targeted strategies to increase user loyalty and referral rates.
- Designing referral programmes and incentivising positive word of mouth to attract new users while leveraging the engagement of existing users led to increased uptake of the app.
- App has been improved in several ways. The three most important changes were:
 - o Multiple materials (e.g., PP plastic and HDPE plastic) can now be added within a single transaction. This saves a lot (1-5 minutes) of buyer-seller confirmation time. Before the app could only handle one material for every transaction.
 - o The app now has a manual override seller-buyer confirmation feature after 2 attempts to confirm. This is necessary if the face-recognition feature or the SMS confirmation fails. The face recognition feature of the app failed in 30% of the cases during the pilot. Also, sellers with a feature phone have to confirm the transaction by reading out the SMS code which is sent to them. Due to problems with one of the local TelCo's those SMS verification codes do not always arrive.
 - o For the administrators at Topak and AMOR an improved dashboard and reporting system was built, so that they can monitor the volumes bought, the prices paid and any erratic behaviour by their employee-buyers



What have these actions led to?

- Number of tonnes and new users in the period July to October grew fastest. Increasing from 83 tonnes to 380 tonnes bought and from 600 new users to 1,880 new users.
- The use of the app sent a clear message to the sellers: 'We are registering everything, so we don't want to mess about'. The effect was that the quality of plastic delivered improved.
- The biggest impact for the informal collectors, was that the prices per KG have become much more reliable, as the employee buyers of both Topack and AMOR could now not underpay the waste pickers for their waste. The waste pickers have now understood that if they aren't paid properly they can refuse to confirm the transaction, and can report underpayment via the app.
- More investment attracted in the sector.

Because of the proof of concept supported by Africa RISE, AMOR has recently managed to get EUR 500,000 approved in follow-on finance from the British government via their ORRA Blue Ocean facility. Over the next 3 years, AMOR will roll out a system that allows consumer goods companies and other private sector companies, like Total (France) to pay for waste collection. Placing collection orders through Kolekt, paying out to informal collectors on delivery at collection points. And once audited by an independent auditor (like Bureau Veritas, SGS, TUV, etc) the system will produce Certificates of waste collection and responsible disposal. Using the mobile-enabled infrastructure of the app, the developer will develop one of the world's first fully integrated 'polluter-pays-for-collection-of-waste-and-recycling' systems. The current systems of "Plastic Credits", which can take months to complete and are overly dependent on consultants, reports and paper-based audits, will be a thing of the past.



3. There is No Time to Waste

In an era of rapid urbanisation and population growth, solid waste management is critical for sustainable, healthy and inclusive cities and communities. If no action is taken the world will be on a dangerous path to overwhelming waste and intolerable pollution. Lives, livelihoods, and the environment would pay an even higher price than they are already doing so today.

Many solutions already exist to reverse that trend, such as this simple example that Mozambique is bringing of a digital app. What is needed is urgent action.

By using the app, clients like AMOR, the NGO and Topack, the recycler, waste buyers and (possibly) municipalities have now access to the volume and source of the waste being collected. This data is provided in graphs, tables, maps and excel downloads. Waste pickers earn additional income, market players in the plastic value chain improve operations that ultimately impact positively their bottom line.

However, having an app is not enough. What the case of Mozambique showed us was that using feedback loop midway was critical for adaptive management, taking decisions, allocating funds and improving the app to move investments closer to making an impact on the recycler, AMOR and their supply chains.

By focusing attention on users' experiences Topack has proven that they value their suppliers, took notice of their needs and concerns, and, with adjustments, made the app work for them. " For Topack, the app enables more transparency to the transaction and business overall", said Tiago Cepeda.

"KOLEKT is now fully embedded in Mozambique and is proving popular with users throughout the country recycling chain", Thierry Sanders, lead expert Africa RISE.

The time for action is now.



Key takeaways

- Despite millions of tons of plastic going to waste each year, we have a distinct lack of quality recycled plastic stock on the global market. An app can offer smart tools for every link in the plastics/other waste value chain.
- Using an app for plastic waste management can be successful in "leaving no one behind".
- Listening directly from users of the app can add value in showing where the app works well, but also where work is still needed.
- Using feedback loop mid-way is critical for adaptive management, taking decisions, allocating funds and improving e.g., the app, to move investments closer to making an impact.
- By focusing attention on users experiences a recycler like Topack can prove they value its suppliers. While still creating value, Topack ensured that this value is distributed across its supply chain.

You can find out other examples of the Africa RISE work on circular economy in the Africa RISE Global Gateway map below:

Global Gateway Project Map

● Climate & Energy	● Health
● Digital	● Transport
● Education & Research	●

Regional - IOC

- Support for regional cooperation projects on women's entrepreneurship
- Regional Value chain

Regional - EAC

- EAC single digital market

Regional - COMESA

- Regional circular economy project

Regional - SADC

- Circular Economy and Extended Producer Responsibility Platform
- Strategic transport corridors
- Improve circular business practices in construction in Namibia, Zimbabwe and Botswana
- Digital app for solid waste management Angola and Mozambique

Regional

- EAC single digital market

NAMIBIA

- Assessment study on e-commerce readiness in Namibia
- Support for implementation of e-commerce improvements
- Review data protection act
- Critical Raw Materials regional value chain opportunities
- Twinning Guidelines
- EITI workshop

BOTSWANA

- Promoting investment and business climate reforms in Botswana's ICT sector
- National Innovation Capability framework
- Digital entrepreneurship package for women
- Innovation as a force for Growth Conference
- Pharmaceuticals feasibility study

ESWATINI

- E-commerce readiness assessment for Eswatini
- Bulembu village Renewable energy feasibility study
- Human development and social inclusion

ANGOLA

- Circular economy Analysis
- Support for national waste conference
- Urban solid waste management strategy

ZAMBIA

- Private sector action document support
- Copper wire market study

TANZANIA

- Blue economy investment scoping study

MOZAMBIQUE

- Feasibility study for a plastic to lumbers platform in the port of Beira
- Introduction of the Environmental Tax on Packaging
- Improvement of municipal solid waste management services
- Study on job opportunities for women in transformation towards green economy

SEYCHELLES

- Single window for port users
- Domestication of FAL forms

MAURITIUS

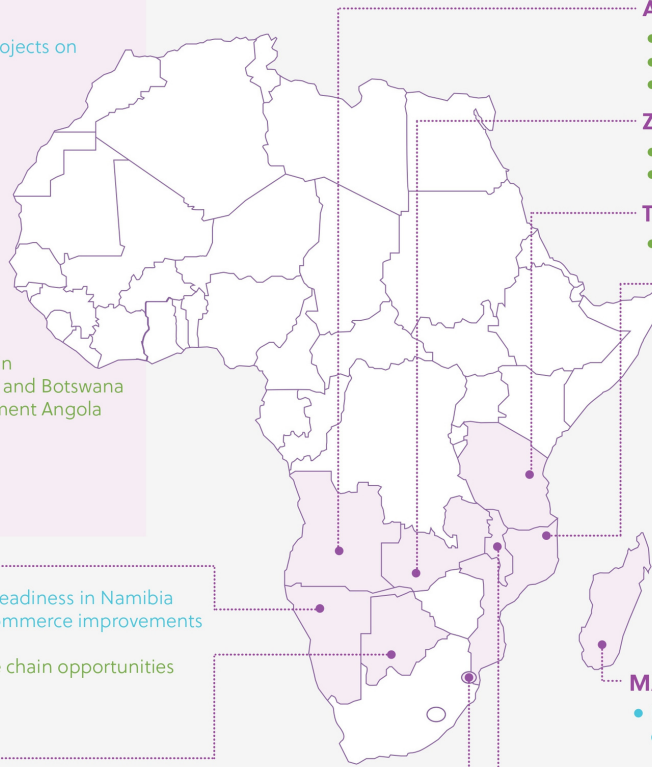
- Feasibility study into establishment of a vehicle scrapyards
- Strategy for development of Pharmaceutical and Biotechnology sectors

MADAGASCAR

- Peer to peer learning on digital transformation

MALAWI

- Productive Use of Renewable Energy



The European Commission and the EU High Representative have set out the Global Gateway, a new European strategy to boost smart, clean and secure links in digital, energy and transport sectors and to strengthen health, education and research systems across the world.

39 of our projects, representing 55% of investment committed, are contributing to Global Gateway on all 5 investment priorities: Digital, Transport, Climate & Energy, Health, and Education & Research

THANK YOU

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Our partners for this project have been:



For more information about this learning brief and Africa RISE work in the sector



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