E-mobility
Innovation spotlight

October 2023

Global Distributors Collective

Delivering products at the last mile using electrically powered two- or three-wheelers

Globally, transportation contributes about one-quarter of total energy-related greenhouse gas emissions and is a leading cause of ambient air pollution (UNEP). A transition to low-carbon transportation solutions such as electric vehicles (EVs) can significantly reduce this figure. EVs offer sustainable and efficient transportation alternatives that can replace traditional fleets used by last mile distributors globally. In Africa, electric two- and three-wheelers are already the fastest growing vehicle segment (FMO, 2022), and experts interviewed by the GDC believe that for distances shorter than 100 km per day, small trucks, tuk tuks, motorcycles or bicycles powered by electricity, will become the standard in the next five years.

Smaller electric vehicles are on the rise in low-income countries

Innovations like e-mobility are only just emerging and not relevant for all last mile distributors yet. Not all countries present equally attractive opportunities. Rwanda and Kenya are expected to transition faster than other African countries due to their conducive policy environment. EVs in these countries will account for 60-75% of all two-wheeler sales by 2040 (McKinsey, 2022). In India, about 40% of all tuk tuks is expected to be electrically powered in 2025, rising to 70% in 2030 (RBSA Advisors, 2021). Today, EVs are mostly popular for commercial usage. This is because the economics improve when vehicles are driven very regularly. It is therefore no surprise that more than 90% of two-wheelers are purchased for commercial use cases, mostly in urban and peri-urban areas such as moto-taxis or food delivery services (McKinsey, 2022). There are a few companies leading the way in transportation services for smallholder farmers in rural areas, such as Mobility Africa in Zimbabwe, Think Bikes in Nigeria, and Onyx in Rwanda.

The majority of electric motorcycles are imported from China and India and often not built for conditions in other regions such as Africa (PREO). However, there is a rise of manufacturers specialised in developing vehicles for rough terrains in rural markets. A study commissioned by FMO in 2022 found 50 EV-related startups in Kenya alone. In Asian countries like Bangladesh, companies like Beevatech claim that 70% of the parts used for their electric cargo vehicles, including the battery, are made in Bangladesh.

Photo credit: Mobile Power

Benefits of e-mobility

Lower **running costs** for distribution

Extend **reach of agents** in a convenient way

Reduce **carbon emissions** of the company

Overcoming obstacles for the purchase of electric vehicles

Some of the reasons that last mile distributors might be hesitant to adopt EVs include the high upfront purchase costs (because of expensive batteries and the lack of second-hand vehicles); range anxiety (the driver's fear that a vehicle has insufficient energy to cover the distance needed); and long battery charging time.

High purchase price

Although the purchase of EVs has become a lot cheaper now that batteries are produced at scale, EVs are generally more expensive than traditional vehicles that use combustion engines. Higher upfront investments in EVs, however, can be returned over the longer term due to savings on fuel and maintenance. Ampersand reports that boda boda drivers using their e-bikes every day are able to save over 500 USD per year. There are already more than 1,000 Ampersand e-bikes on the road in East Africa. To tackle the barrier to purchasing EVs, some governments have started to offer subsidies and other incentives. As of October 2023, the Government of India (2022), for example, provides a subsidy of Rs. 20,000 for the purchase of two-wheelers; while the government of Rwanda (2022) announced tax exemptions for EV sales. Furthermore, asset financing companies such as Mogo in Kenya and Tugende in Uganda are adding EVs to their portfolio. And innovative business models are also emerging that enable e-mobility to not only become more affordable but to also scale in markets that lack charging points; for example, battery-swap subscriptions and pay-per-user charging.

Range anxiety

While governments are called to support the scaling of nation-wide charging infrastructure (McKinsey, 2022), shorter term solutions are required. Luckily, electric two- and three-wheelers do not require advanced charging stations and often come with a portable charger that can be plugged into any external 110/220V AC socket. This means companies or mobile sales agents are able to conveniently charge their EVs at home, the office, a warehouse or any other place with a power socket; thereby reducing the 'range anxiety' that users can otherwise experience.

Charging time

A full charge takes up to four hours for electric motorbikes. Some companies and sales agents are concerned that this time will eat into their working day and therefore reduce productivity and affect sales levels. If charging happens during evening hours or lunch breaks, this reduces the idle time of EVs. Another solution to reduce charging time and effort is to replace empty batteries at battery swap stations when available.

Photo credit: Pollinate Group

Trailblazer story

Mobile Power

“We already had a successful battery swap business for households, but we believed that the pay-per-use battery swap model could also enable electric mobility.”

About the company

Established in 2013, Mobile Power began operations in Sierra Leone and has since set up operations in Nigeria, DRC, Liberia, Uganda and Chad. They operate a network of solar-powered pay-per-use battery swap stations called MOPO Hubs. MOPO agents serve customers to rent lithium-ion batteries. Customers can access small batteries like the MOPO50 for phone charging and lighting as well as larger MOPOMax batteries for running AC appliances like freezers and productive use appliances.

Photo credit: Mobile Power

Why did they start with EVs?

After perfecting their rental model for provision of electricity, Mobile Power chose to diversify their business by venturing into the EV domain. Through the support of the UK aid-funded PREO programme, Mobile Power has developed a battery swap network for motorcycle taxi drivers using different combinations of its 1kWh MOPOMax battery. The batteries are charged via solarat MOPO Hubs.

Key learnings

Mobile Power has shown that solar-powered battery swap solutions can be a multi-billion dollar opportunity in African markets — one for which they are leveraging their powerful technology IP and experience to unlock. Customer feedback has been very positive. Given the high prices of fuel, the unit economics for the riders and households were vastly improved when compared to petrol motorbikes and small household generators. Data shows that the e-motorbikes can improve the daily profits of the riders.

By layering the electric mobility business model over their existing electricity business, Mobile Power is uniquely achieving several key synergies. They minimised new technology investments as they use the same network of MOPO Hubs which they already had for their battery rental service for households and businesses. Also, using the MOPOMax batteries for both households and mobility, improved the overall profitability of the whole business.

Visit website

Trailblazer story

Jumia

“The most exciting thing about e-bicycles and EVs more generally, is that they make business sense! It’s a win-win for society and the bottom line.”

About the company

Jumia is one of Africa’s leading e-commerce companies that offers a wide selection of electronics, fashion, home appliances and much more. In major cities, customers get their orders delivered to their doorstep; while in rural and remote areas, customers can collect their orders at Jumia pick-up stations. Jumia was launched in Nigeria in 2012 and has since expanded to a further 12 African countries.

Why did they start with EVs?

In 2021, to increase its efforts towards sustainability, Jumia partnered with various e-bike companies in Kenya and Ghana to provide affordable and eco-friendly deliveries to consumers. Jumia delivery agents ride electric scooters from SolarTaxi in Ghana and e-cycles from eBee in Kenya.

They started with a three-month pilot and 20 vehicles only. Following the successes, Jumia has taken steps with SolarTaxi to have solar-powered bikes comprise at least 40% of their entire delivery fleet in Ghana by the end of 2023. Partnering with SolarTaxi was important to them because they not only design and build vehicles optimised for Ghana, they also provide a comprehensive service that spans bike maintenance, as well as rider recruitment and training.

Key learnings

By delivering more products by electric bikes, Jumia was able to significantly lower their carbon footprint. They also reduced the cost of delivery and reliance on petrol, which has become 70% more expensive in Ghana.

Photo credit: eBee

Visit website

GETTING STARTED

Assessing the opportunity for your company to switch to electric vehicles

If you are a last mile distributor, the attractiveness of EVs depends very much on your motivation, location and actual usage. We encourage you to consider the following questions when assessing if it is the right time for you to switch to EVs.

Is your company ready?

☑ What is your motivation to go electric?

Some key reasons to purchase EVs include the financial advantage over time and the desire from investors or the company's leadership to reduce the carbon footprint of the organisation. EVs also present possibilities for delivery agents to extend their reach in a convenient way. This is particularly true for agents that switch to pedal assisted alternatives such as electric bicycle rickshaws or e-bicycles. Lastly, EVs may enhance the brand value of distributors if consumers, for example, have their renewable energy solutions delivered through a sustainable means of transportation. Take time to reflect on your internal and external drivers to switch to e-mobility and make sure to get buy-in from both your leadership as well as your riders. EVs are a long-term commitment.

☐ How often will the EV be used?

The economics of owning an EV improve significantly when the vehicle is used for daily trips. So, instead of using an electric motorbike or tuk tuk for occasional intracity deliveries from one warehouse to another, use them for last mile deliveries with riders driving from customer to customer. To reduce idle time, you could consider sharing the vehicle with other companies or individuals.

☐ Buy or lease?

With prices between 1,000 USD and 5,000 USD per vehicle, two- or three-wheelers are a lot cheaper to purchase than four-wheel vehicles and they fit the need for last mile deliveries in terms of payload capacity, which is the amount of weight that can be carried. However, in comparison with traditional vehicles that use combustion engines, the price of EVs can still be prohibitive for last mile distribution companies. If there are no subsidies, tax exemptions or credit providers available, but you are still keen to trial EVs, you might want to consider leasing the EV when this option is available.

Calling all governments, development partners, and investors!

To build a more favorable ecosystem for EVs to scale in low- and middle-income countries, advisory firms such as McKinsey (2022) recommend the following actions.

1. Scaling electricity infrastructure, especially EV charging points, or investing in companies that provide batteries-as-a-service.
2. Innovating local production and supply chains by scoping for reputable suppliers and facilitating DIY electrification of vehicles.
3. Setting targets for phasing out sales of polluting vehicles or introducing fiscal incentives such as tax exemptions for EV sales.

More recommendations can be found in this McKinsey report (2022) or this report by the UK aid funded program PREO (2023).

Is your country ready?

☑ How do electricity and fuel prices compare?

In some countries, gasoline subsidies make it impossible for EVs to compete. In other countries, sales of EVs spiked when gasoline prices skyrocketed during the Russian invasion of Ukraine. Some EV suppliers like Roam Electric help you calculate your savings after taking into account current fuel prices in your country. In Kenya, running costs of EVs can be up to two thirds cheaper according to Roam. Besides savings on fuel, EVs also present savings on maintenance and repair because they have fewer parts; with Roam suggesting that service and maintenance costs can be up to a third cheaper than for traditional gasoline vehicles. Considering these potential savings, it is worth calculating how long it would take you to recoup your investment in EVs, to help you decide if it is a viable investment for your company. This is especially useful when you take a loan and agree with the asset financier on the payback period. Be aware that it will most likely take years, rather than months, to recoup the upfront investment of switching to EVs. In India, electric three-wheelers achieve cost parities of diesel and petrol vehicles in less than two years.

☐ Is there sufficient charging infrastructure and are EVs allowed on the road?

Even in countries where EV sales are booming, most infrastructure and services are still optimised for vehicles running on fuel. Smaller EVs can be plugged into the regular grid, while larger vehicles might require more powerful charging points to increase the speed of battery charging. Once you have identified the range and charging requirements for the EV that you are considering, make sure to map the charging points in your market. This lets you plan for optimal routing. If certain areas lack charging possibilities, you could explore partnerships with companies that offer batteries-as-a-service such as Arc Ride in Kenya or Zembo in Uganda. They may even be planning to expand their service to new countries of operation, so do not hesitate to get in touch with the teams to see if your country is in the pipeline. Betting on the arrival of affordable and abundant electricity is not recommended, because if LMDs are forced to use, for example, diesel generators to power e-bikes in the meantime, the economics of investing in EVs in the first place will no longer work.

☐ Can you find local suppliers of robust vehicles?

While the number of EV manufacturers is increasing, there are only a few vehicle options available that withstand extreme heat, rain and bumpy roads. Because EVs are such a new product category, repair skills as well as spare parts are also not widely available yet. Before investing, you should therefore look for reputable suppliers in your country and compare their offerings, including the warranties they provide, their after-sales support services, and financing options. Take a look at the next page for examples of current market players, as well as events and other resources you might be able to use to identify suitable suppliers. And of course, do not forget to ask for a test drive!

Instead of purchasing EVs you can also retrofit an electric motor on traditional vehicles, such as bicycle rickshaws. This has become very popular in rural Bangladesh and India. Suppliers sell DIY-kits for as little as 50 USD on Alibaba.

☐ Can you access financial support?

Currently, your best chance of accessing financial support is from the EV suppliers themselves. If the supplier does not offer financing options it may be difficult to secure this, since many financial institutions perceive EVs as a risk. This is due to the institutions' lack of product understanding, the absence of cheaper second-hand vehicles and uncertainties around battery lifetime. In some countries, pioneering EV financers such as Mogo, M-Kopa and Bboxx have partnered with EV manufacturers.

Examples of electric vehicles

The options below illustrate only the categories which we consider relevant for last mile distributors. They do not reflect any particular preference or endorsement by the GDC. Make sure to look for more brands and models, preferably sold by a supplier, manufacturer or distributor in your country.

eBee Nyuki
Electric bicycle

Range	60 km
Payload	20 kg normal, 50 kg max
Speed	33 km/h max.
Price	750 USD (or lease/PAYGO)
Website	eBee Africa

Roam Air
Electric motor bike

Range	70 or 140 km (dual battery)
Payload	220 kg
Speed	90 km/h max.
Price	1,500 USD (or MKOPA PAYGo)
Website	Roam Electric

Mahindra Zor Grand DV+
Electric cargo tricycle

Range	100 km
Payload	400 kg
Speed	50 km/h max.
Price	5,250 USD (ex. Bangalore)
Website	Mahindra

Market players to look out for

This is a non-exhaustive list that merely aims to get you started.

Manufacturers of EVs

Ampersand (Rwanda), Beevatech (Bangladesh), eBee (Kenya), Fyn (India), MAX (Nigeria), Mobility for Africa (Zimbabwe), Roam Electric (Kenya), SolarTaxi (Ghana), Stima Boda (Kenya), Think Bikes (Nigeria).

Providers of battery swap solutions

Arc Ride (Kenya), Zembo (Uganda).

Logistics companies with EV fleets

SiCepat Ekspres (Indonesia), OX Delivers (Rwanda, more in our Spotlight article (2022)), Payo e-commerce (The Philippines).

EV finance companies

M-Kopa (Africa), Mogo (Kenya), Tugende (Uganda).

Opportunities to pursue your e-mobility ideas

- [x] Take part in (recurring) events such as the Africa e-mobility Forum that was last held by UNEP in March 2023.
- [ ] Join networks and communities such as the Association for Electric Mobility & Development in Africa (AEMDA, 2020).
- [ ] Connect with development organisations implementing e-mobility programs such as GIZ, who are promoting India's transformation to sustainable and climate-friendly e-mobility. Siemens Stiftung has programs in Africa and donors like the UK aid-funded PREO, EEP, USAID DIV and P4G have a track record of financing EV projects. Read more about the EV companies PREO has supported so far in this report.
- [ ] See if you can contribute to national dialogue about EVs, for example, via networks such as AEMDA, to inform official roadmaps such as this roadmap in Kenya, which was commissioned by the German Embassy in Kenya.

Global Distributors Collective

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