



East Africa Fruits: promoting banana farming in Tanzania

This report was produced by Triple Line, based on data from East Africa Fruits (EAF) and research and data analysis conducted by Solidaridad Eastern and Central Africa Expertise Centre (“Solidaridad”) obtained from a household survey of 278 participants. The research was commissioned by EAF and Shell Foundation (SF), with funding from the UK Government’s Foreign Commonwealth and Development Office (FCDO) under the Catalysing Agriculture by Scaling Energy Ecosystems (CASEE) programme. The objective was to test the hypothesis that solar off-grid collection centres located in rural areas enable EAF to serve more rural farmers, reduce post-harvest loss by facilitating quality monitoring and storage of more produce, and improve livelihoods by increasing income to farmers. It also hypothesised that centres reduce the aggregation cycle, thus leading to business efficiencies. The research findings outlined below provide promising data to support the hypothesis.

Challenges with the banana value chain in Tanzania

Bananas and plantains form the **staple food in the high rainfall areas of Tanzania**, especially on the south-eastern slopes of Kilimanjaro and in the southwest and northwest areas of the country around Lake Victoria. While bananas and plantains are grown in many parts of the country, bananas occupy more than 50% of the cropped land, particularly in west Tanzania. Over 900,000 farming households in the country are engaged in banana production for food and economic purposes.¹ In fact, in the comprehensive banana-based agricultural systems of Kilimanjaro, Kagera and Mbeya, about 70-95% of households grow bananas for food and/or economic reasons.² These areas contribute more than 60% of bananas grown in the country, which embraces their traditional farming methods.³

However, **the overall banana production is reported to be very low**, not exceeding 10% of the crop’s potential of over 60-70 tons per hectare per year.⁴ Annually, Tanzania produces about 4 million metric tonnes with a consumption rate between 280 and 500 kg per person per year.⁵ The banana value chain faces multiple constraints such as an underdeveloped banana handling and storage infrastructure and limited investment and capacity. This has led to **high costs of operation and rates of post-harvest loss (PHL)**, which in turn has translated in low returns for smallholder farmers.

There have been efforts by the government to address these challenges by sensitising banana growers about the benefits of joining the Agricultural Marketing Cooperative Society (AMCOS) which helps members increase their bargaining power in markets, and by introducing the National Post-Harvest Management Strategy (NPHMS) (2019-2029) in collaboration with other stakeholders to focus on promoting the availability, accessibility, affordability and adoption of tested technologies and processes to reduce PHL. Despite these efforts, crop production has fluctuated substantially in recent years with a **steady decline since the 2018/2019 season**, negatively impacting the livelihoods of smallholder banana farmers.

The role of off-grid cold storage technology

Off-grid solar energy provides a safer, cheaper and reliable alternative to access energy for millions worldwide. The use of diesel and petrol generators is expensive, hazardous, polluting and harmful to people’s health. Clean off-grid solar energy products, on the other hand, provide an alternative that is beneficial to individual consumers and society, directly contributing to the Sustainable Development Goal (SDG) Target 7.1.⁶

¹ NBS, 2012.

² Byabachwezi and Mbwana, 1999; Kilimo trust, 2012.

³ Yamaguchi, 2004.

⁴ Van Asten et al., 2005; NBS 2012.

⁵ Kilimo trust, 2012; Phumelele, 2016.

⁶ SDG Target 7.1: By 2030, ensure universal access to affordable, reliable and modern energy services.

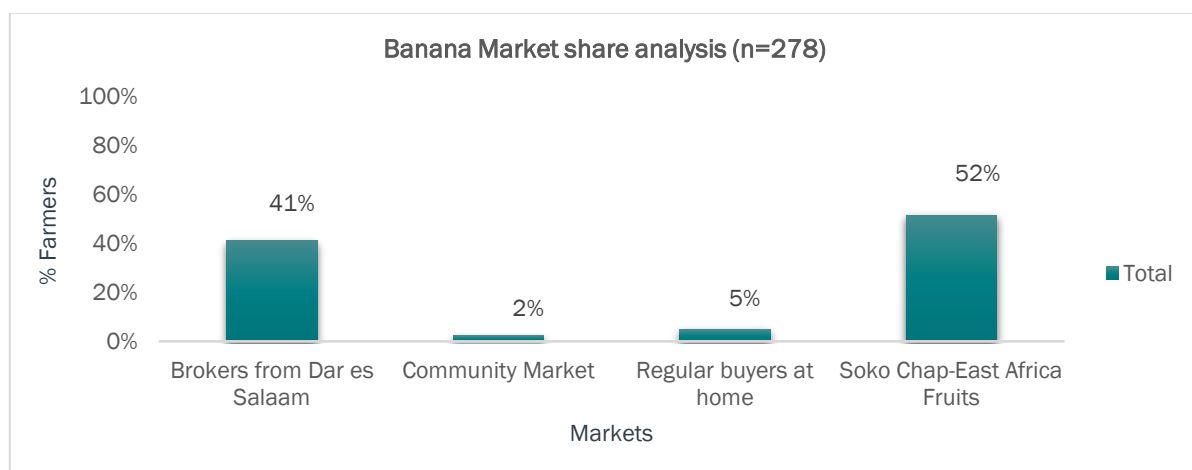
In the context of banana farming in Tanzania, **off-grid or solar-powered cold storage makes banana ripening viable** at the village level, helping to reduce food wastage and providing economic opportunities to smallholder farmers by enabling them to sell ripened bananas instead of green bananas, which have a lower market value. The off-grid cold storage technology provides uninterrupted cooling that is fit-for-purpose for those places that are off-grid or have unreliable grid connectivity as it allows banana growers to efficiently store and transport their produce at shorter distances and thus reduce the damage associated with deficient storage conditions and long-distance transportation. It is estimated that about **40% of the bruises and loss of bananas in Tanzania are due to poor post-harvest handling**.⁷ The operation of the cold storage is fully automated, requiring minimal training, with an option for the system operator to monitor its performance remotely via web-enabled devices.

East Africa Fruits’ business model and investment in solar-powered facilities

East Africa Fruits (EAF) is a social enterprise based in Dar es Salaam, Tanzania that connects sellers to buyers of fresh fruits, vegetables and grains. The company believes that addressing inefficiencies along the banana value chain will resolve the issues affecting the sector such as non-functional pack houses, poor packaging, lack of storage and transport, and poor agronomic practices, and lead to an increase in banana shelf-life and a decrease in post-harvest losses. It serves a total of 6,977 farmers, 710 of whom supply bananas that are stored in solar-powered cold units. Currently, EAF has 11 cold storage units, two of which are solar-powered, located in the northern and coastal zones of Tanzania.

Figure 1 shows that 52% of farmers surveyed by Solidaridad as part of a study funded by EAF report that they sell their bananas through Soko-Chap (an EAF centre), 41% sell through brokers in Dar-es-Salaam, and the rest through community markets (2%) and regular buyers at homes (5%). Traditionally, farmers will sell their produce to brokers at a low price in order to expediate the sale and limit their post-harvest losses.

Figure 1: Banana market share analysis (May, 2022)



EAF has observed that over the past year (2022), the number of smallholder farmers selling banana produce through brokers has reduced by 25% as a result of the installation of low-cost off-grid cold storage facilities. The availability of such infrastructure allows farmers to fetch competitive prices from the market without the exploitation of middlemen.

Delivering the produce to EAF Soko Chap immediately after harvesting helps reduce post-harvest loss as the centre provides cold rooms to store the bananas. In fact, Solidaridad data shows that 95% of

⁷ Van Asten et al., 2005; NBS 2012.

the produce of farmers who are members of the EAF aggregation centre reaches the market in a fresh condition compared to 65% of the produce of those who are not members.

EAF members also benefit from market linkages provided by the company’s network. **Table 1** shows monthly income data of 345 banana farmers, before and after engaging with EAF.

Table 1: Farmer incomes from banana sales

Income of smallholder farmers from banana sales	USD (Monthly- 2021/2022)			
Average income after working with EAF (per farmer)	191	174	200	190
Average income prior to working with EAF (per farmer)		112		
Income uplift (per farmer)	79	62	88	78

The uplift in income goes directly to the farmers. EAF does not take commission from the farmers when they offtake farmers’ produce.

While the evidence shows an income uplift for banana farmers when engaging with EAF, EAF finds that existing containers and collection centres are not enough to meet the needs of all smallholder farmers unless the value chain is streamlined to provide affordable, efficient, and acceptable cold storage facilities.

Challenges experienced by East Africa Fruits in upscaling operations

While the benefits provided by off-grid cold storage in preserving produce long enough for farmers to catch good prices in the market have been well established, EAF faces challenges in upscaling operations due to the realities of the Tanzanian context.

EAF finds that one of the major barriers of scaling up operations is **the affordability of solar-power cold storage technology**. The cost of deployment of such technologies within the Tanzanian context is highly prohibitive both for solar service providers and smallholder farmers since they have a high-power requirement and thus demand more batteries. It is not possible for smallholder farmers to deploy this technology on their own without the support of either the government or development partners. It is estimated that the cost of deploying a medium-size solar-powered cold storage facility would require close to US\$20,000 and above. This is high cost compared to farmers’ incomes outlined in **Table 1**.

Similarly, **the 10 MT cold room space that is available is not enough to meet the market need**, which demands 150 MT capacity of at least 10 MT per each packing unit for good storage. As such, EAF is forced to overload the current storage facility to up to 15 MT per unit, which is less than 10% of the need. This in turn affects the quality of bananas due to the rising temperatures inside the storage room.

Finally, scaling up EAF operations is restricted by farmers’ **limited knowledge and awareness of the benefits of these technologies**. The Solidaridad study finds that only 29% (81) of the 278 farmers surveyed showed knowledge of the benefits of cold rooms. In fact, a majority of 62% (172) did not think that cold rooms would be beneficial to them as farmers with the remaining 9% (25) reporting that they did not know about the benefits of cold rooms. A further analysis conducted by Solidaridad

shows that while 31% (86) of respondents survey noted receiving some kind of technical support, the majority of 69% (192) stated that they have not received any kind of technical support aimed at improving the productivity of their banana farming. Out of the 86 who receive technical support, 72 indicated that the support they receive is from the government extension officers; seven noted that the support is from East Africa Fruits and the rest from farmers' groups and the Tanzania Coffee Research Institute (TaCRI).

Conclusion

Although solar-powered cold rooms have helped greatly reduce post-harvest losses, improve the quality of banana crops and increase farmers' profit margins, existing containers and collection centres are not enough to meet the needs of all farmers. The availability of cold storage facilities which are affordable, efficient and relatively cheap to maintain is a must to enhance smallholder farmers' livelihoods. This is why East Africa Fruits has focused on finding ways to leverage solar-powered cold storage technologies to scale.

There is a need to increase investment in villages where smallholder farmers are based due to the various challenges they face in transporting produce from their farms to existing EAF centres. This can be done by leveraging green energy funding from different development partners and funding agencies. Not only will expanding the network of such centres reach more farmers but operations costs will also be lowered and cold storage capacity increased, allowing bananas to be stored in the right conditions. However, this effort will also need to be accompanied by extension service support as many farmers are still not aware of the value of cold storage facilities. EAF can consider a partnership with the government of Tanzania to provide this support which will not only have an impact on enhancing the productivity of the produce but also in enhancing the awareness and acceptance of banana farmers to integrate solar-powered cold storage facilities alongside the banana value chain.

From the direct insights gathered through this research, EAF plans to deploy modern, technology-driven programmes and systems that will improve business efficiency and lead to a sustainable and reliable supply and value chain. These include, but are not limited to, the set-up of more solar-powered collection and ripening units close to the farmers and markets, the set-up of solar-powered storage warehouses, data gathering and market access to farmers using mobile apps, as well as training and demonstrations delivered to farmers. EAF hopes these multifaced efforts will help increase farmers' productivity, enable food security assurance and mitigate against post-harvest loss, expand their access to markets, and ultimately help smallholder farmers in Tanzania commercialise their farming and increase their incomes.