CASE STUDY

Transforming Liberia's Wild Palm Supply Chain with Blockchain

The GSMA Innovation Fund for Climate Resilience and Adaptation

J-Palm Liberia

The GSMA Innovation Fund grant for J-Palm has supported the development of digital solutions to enhance the climate resilience of palm oil harvesters in Liberia by improving production, transparency and traceability within wild-harvest palm oil supply chains, thereby facilitating sales.

Country: Liberia

Sector: Forestry, non-timber forest products

Business model: B2C

Resilience capacity: Climate adaptation, natural resource and environmental management

Digital channels: Blockchain, mobile app, digital payments

Problem addressed: Tackling some of the critical challenges in the palm oil industry, including inefficiencies in traditional processing, limited market access for rural harvesters, and environmental degradation caused by unsustainable practices

Stakeholders: Smallholder oil palm farmers and processors

Find out more: J-Palm website

J-PALM PROJECT OUTCOMES NOVEMBER 2022 - JUNE 2024

12.2k **people reached**

3,063 **harvesters supported** to adapt to climate change

100% of harvesters say their **income has improved** and that they are able to now **sell more product**

About J-Palm

J-Palm is a startup based in Liberia that is dedicated to transforming the palm oil industry through sustainable practices and innovation. J-Palm has introduced mini mills to replace manual palm oil extraction, assisting smallholder farmers and harvesters in Liberia to become more efficient by enabling them to produce more oil and reduce processing time and water use.

J-Palm also purchases palm kernels from farmers, which would otherwise be discarded, to create palm kernel oil and natural beauty products under their 'Kernel Fresh' brand. The company is committed to environmental sustainability by producing clean energy from palm kernel shells to reduce deforestation. Through its no-waste manufacturing process, J-Palm Liberia fosters economic growth, improves livelihoods and promotes environmental stewardship across Liberia.

Introduction

Impact of climate change on harvesters in Liberia

Climate change causes unpredictable weather patterns in Liberia, including rising temperatures, erratic rainfall and increased frequency of extreme weather events such as floods and droughts. These changes significantly impact palm oil production and disrupt traditional farming practices, particularly for smallholder farmers and wild harvesters.

Liberia's palm oil industry consists of traditional wild harvesters, smallholder farmers, medium-sized growers and large concessionaires. Both wild palm harvesting and cultivated palm farming are integral to Liberia's economy. The palm farming industry in Liberia has seen significant growth in recent years, primarily driven by large-scale plantations run by multinational corporations. These plantations have adopted formal cultivation practices which have boosted palm oil production. By 2021, approximately 21.2% of farming households were engaged in palm oil production, employing over 220,000 individuals in the sector.[1] In 2022, Liberia exported $90.8 million worth of palm oil.[2]

The expansion of oil palm farming poses risks of deforestation and water pollution. While Liberia adheres to international treaties on sustainability and labour rights, the industry faces criticism for unsustainable practices.

Wild harvesting of palm is more sustainable than large-scale farming as it preserves ecosystems, prevents deforestation and maintains biodiversity. It allows palm trees to grow naturally, reducing the need for chemical fertilisers and pesticides, and supports traditional livelihoods, empowering smallholder farmers by providing a decentralised, community-based income source without the environmental costs of intensive cultivation.

Wild harvesters, who rely on gathering palm fruits from forests for their livelihoods, face increasing challenges as climate change disrupts fruiting cycles and reduces yields. These challenges are especially concerning given agriculture's critical role in Liberia's economy, employing over 60% of the workforce.[3]

In response, the Liberian government, with support from international organisations, has developed policies and initiatives to promote climate resilience. One key strategy is Liberia's National Adaptation Plan (NAP), which focuses on building resilience in vulnerable sectors such as agriculture, forestry and coastal zones through sustainable land management, reforestation and climate-smart agricultural practices.[4] The country has implemented community-based adaptation programmes for palm oil production, which seek to empower local communities, including wild harvesters, with tools and knowledge to adapt to climate change. These programmes provide training for sustainable harvesting techniques and alternative livelihood opportunities to reduce dependency on palm fruits.

1. UNDP. (2022). National Oil Palm Strategy and Action Plan of Liberia (2021-2025).
2. OEC. (n.d.). Palm Oil in Liberia. Accessed 4 March 2025.
3. UNFCCC. (n.d.). Liberia National Adaptation Plan (NAP).
4. EPA. (2021). Liberia's National Adaptation Plan Communication Strategy.

About the GSMA Innovation Fund project

J-Palm is one of the start-ups supported by the GSMA Innovation Fund for Climate Resilience and Adaptation, which was launched in 2022. This initiative is funded by the UK Foreign, Commonwealth & Development Office (FCDO), the Swedish International Development Cooperation Agency (Sida) and is supported by the GSMA and its members.

The project spanned 18 months from November 2022 to April 2024. With the support of the GSMA Innovation Fund, J-Palm successfully deployed mini mills, enabling smallholder farmers to improve their agricultural practices, better adapt to climate change, and stabilise or increase their income. Additionally, J-Palm developed and launched a traceability app that has enhanced supply chain transparency and laid a solid foundation for the company's long-term commercial sustainability.

> *In most of West Africa, including Liberia, palm oil is indigenous to the region and grows naturally in the forest without anyone having to plant palm trees... Unfortunately, almost all the farmers who make what is arguably the most organic palm oil in the world, continue to live in poverty because they don't have access to the right processing tools to efficiently produce palm oil.*
>
> **Mahmud Johnson, Founder, J-Palm**

How does the solution work?

The J-Palm solution has the following features:

1 J-Palm's mini mills and waste processing facilities

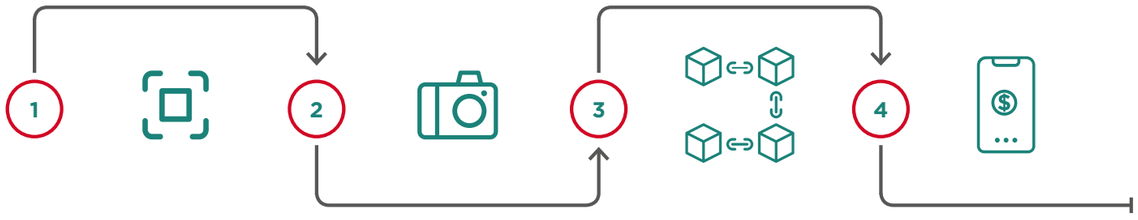
The manual process of extracting palm oil from collected palm fruit involves using a short drum (a large wooden or metal container) to beat the fruit with a heavy tool, and uses a lot of water to separate the oil from the fruit. Mini mills significantly reduce water usage and processing times, and increase palm oil extraction rate for harvesters. In return for using the machines, harvesters give 15% of the oils produced to J-Palm.

2 J-Palm's traceability app

The traceability app bridges the gap between palm oil harvesters and buyers, creating a transparent and efficient supply chain. It helps harvesters sell their palm oil quickly, efficiently and at fair market prices. For buyers, the app provides critical traceability features, enabling them to verify the production, processing and sourcing of palm oil, ensuring compliance with sustainability and quality standards. This innovation not only enhances market access for harvesters, but also strengthens trust and accountability within the palm oil industry.

Figure 1

How J-Palm's traceability app works



Registration

J-Palm registers palm harvesters and processors within the app, adding their name, age, community, geotagged location and picture. Each user is assigned a unique QR code for identification.

Lot creation

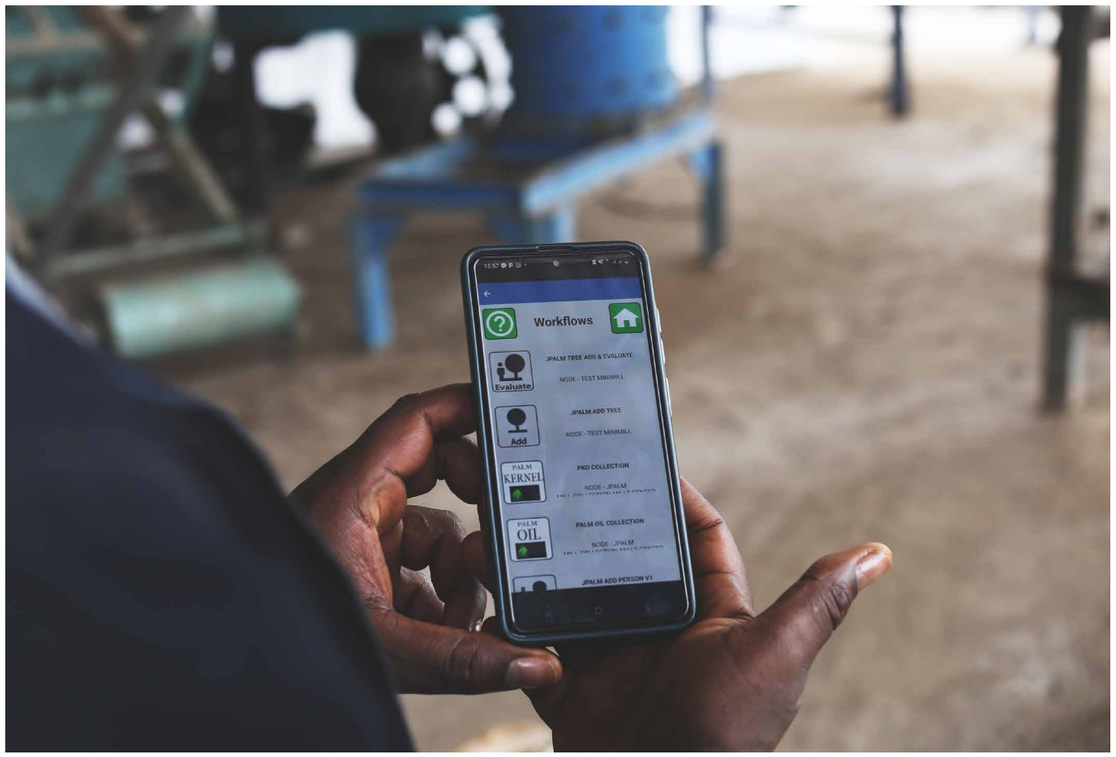
The J-Palm team selects the seller using their QR code or name, tags a picture of the palm kernel lot, and creates an unalterable digital record. All data is uploaded and securely stored, enabling wider analysis and detailed tracking of individual lots.

Traceability

When the palm kernel product is sold, J-Palm agents can trace it back to specific harvesters and processors via the blockchain. The system allows agents to monitor the quantity of palm oil produced and sold by each harvester.

Payment

Once a sale is completed, J-Palm agents can promptly pay harvesters either in cash or through mobile money, ensuring fast and transparent transactions.



Tree mapping app

J-Palm agents register and document individual palm trees by capturing photos, geotagging their locations, and assigning unique identifiers.

The app is then used to estimate:

- Tree age
- Species
- Tree health
- Tree height
- The number of areas in the tree that have been tapped for oil, and how recently the tree has been tapped

This process aims to support harvesters by allowing them to earn payments for the carbon captured by these trees when they are not cut.

Key project activities

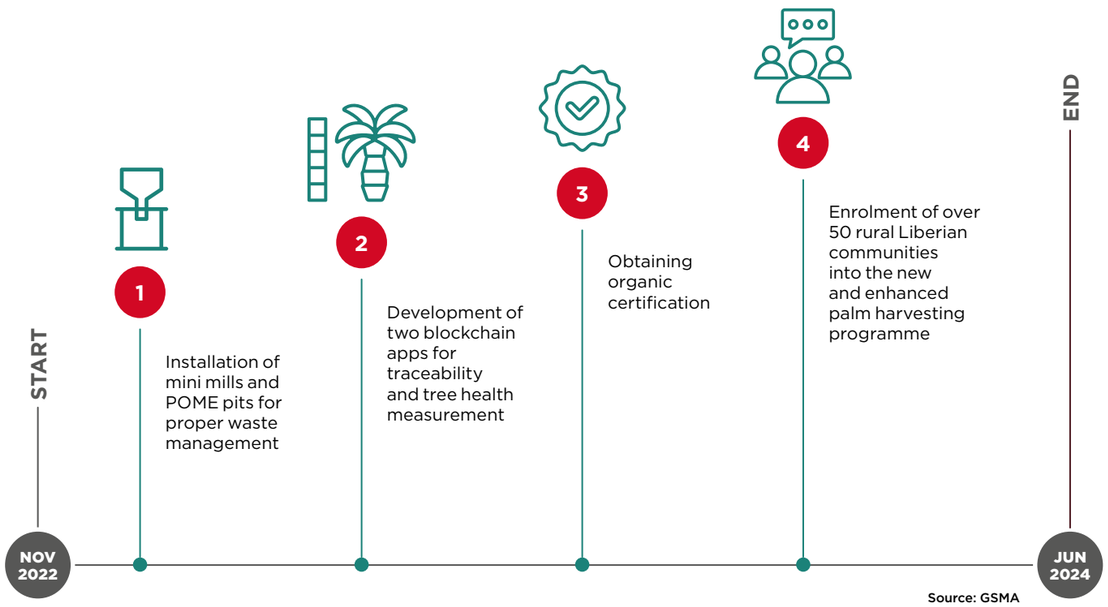
Mini mills and POME pits

J-Palm began by introducing mini mills and palm oil mill effluent (POME) pits to 10 communities. This eventually expanded to 96 communities, following further support from the Whole Planet Foundation.

The mini mills proved highly successful. J-Palm's own field assessments highlighted that the mini-mills reduced palm oil processing time by 90% and cut water usage by 70%. They also boosted palm oil extraction rates by up to 52%, enabling smallholder farmers to increase palm oil production and improve their incomes. Moreover, POME pits enable the safe collection and treatment of POME, a byproduct of oil extraction, effectively preventing harmful runoff and reducing environmental pollution.

Figure 2

Key milestones of the J-Palm project



Source: GSMA

Developing blockchain apps on traceability and tree health

J-Palm successfully developed and rolled out its traceability and tree health apps.

The traceability app has enabled the tracking of over 100 million tonnes of palm kernel oil across the supply chain. This innovation helped harvesters avoid unsold stock and played a critical role in J-Palm achieving both organic and regenified (regenerative agriculture) certifications, making it the first African regenerative agriculture-certified palm kernel oil producer globally. The app demonstrated traceable and sustainable harvesting practices, linking harvests to production targets, which are key requirements for the certifications. The traceability app also positioned J-Palm to export oils to the US, contributing to better-than-expected revenues and securing entry into key global markets.

Conversely, while the technical development of the tree health app was completed, its adoption faced challenges due to the significant time, effort and financial resources required for carbon credit accreditation. As a result, J-Palm prioritised the traceability component of the project.

Building climate resilience

Overall impact

J-Palm supported Liberia's wild palm harvesting communities in building resilience to climate change. The startup improved the capacity of harvesters to adapt to changing climate conditions by providing training on sustainable harvesting practices and access to mechanisation services to process palm oil. Additionally, by better connecting harvesters to buyers, J-Palm improved the financial stability of harvesters. Interviews with J-Palm's operations team and a sample of J-Palm's users revealed the following achievements during the grant period:

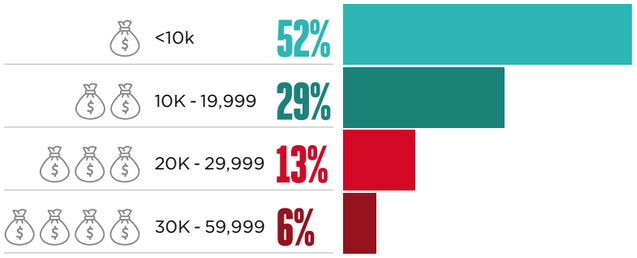
- Provided 3,063 harvesters with better connections to buyers and access to mechanisation facilities to process oil more efficiently
- One hundred per cent of harvesters say their incomes have increased and that they are able to sell more product

J-Palm Liberia user profile

A typical user of J-Palm's services is a male harvester who is approximately 31 years old, lives in the Bong region of Liberia, and has a monthly income of less than 10,000 LRD ($51).

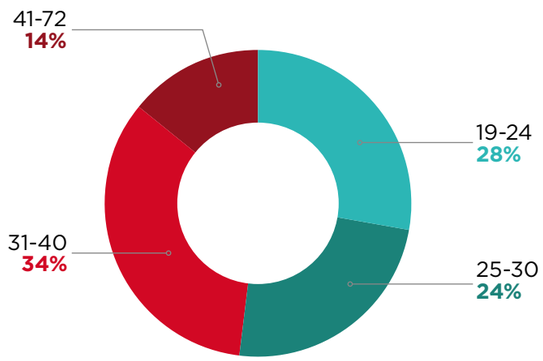
Figure 3
J-Palm user statistics

AVERAGE MONTHLY INCOME (LRD)

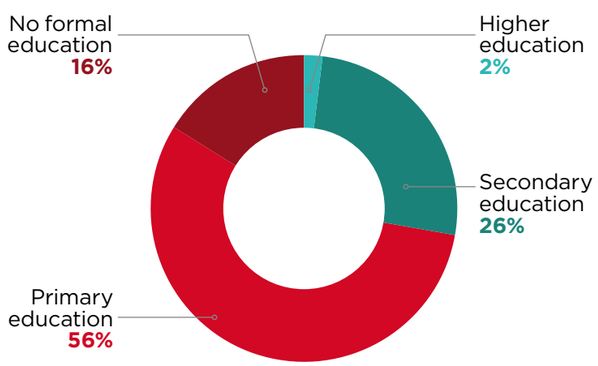


*1,000 LRD = 5.19 USD

AGE



EDUCATION LEVEL



Harvesters report changing weather patterns

GSMA research found that 100% of harvesters had noticed changes in weather patterns and extreme weather events over the past five years, with 60% of harvesters changing their harvesting calendar as a result.

> *There has been an increase in temperatures, which is causing severe drying up of rivers and other sources of water in the community.*
>
> **Male harvester, 37 years old**

Most harvesters surveyed during the final assessment reported that they had not received any support from institutional bodies to cope with the impacts of climate change. 62% claimed to have not received any other support, while 38% said their other source of support beyond J-Palm came from fellow harvesters and associations.

Outcome 1: J-Palm helps harvesters to process palm oil more efficiently and sustainably

J-Palm has used mini mills to support harvesters to process palm oil more efficiently. GSMA research found that J-Palm's mini mills were well received by harvesters because they:

- Helped 100% of harvesters to reduce the amount of time needed for processing
- Enabled 100% of harvesters to process more palm oil from palm fruits
- Facilitated 100% of harvesters to reduce the amount of water needed for processing

> *In the past I used to beat the palm in a short drum using a lot of water in the processing stages. But now, with the mini mill facility, very little water and energy are used for processing*
>
> **Male harvester, 37 years old**

Lesson 1

Maintenance issues with the mini mills could impact the sustainability of the service

Harvesters reported experiencing challenges in using the mini mills due to regular breakdowns of the mills. Ongoing maintenance of the mills is vital to ensure that the mini mills are functional for the harvesters, and are a reliable mechanism for palm processing. This will in turn ensure that the service is more sustainable.

> *One major challenge is the maintenance of the mill bearing systems. J-Palm initially supported us with the bearings whenever they were damaged, but now, we find it difficult to find the bearings when they need a replacement. It is also costly and time consuming to get them, so it affects our production and our income from palm oil."*
>
> **Male harvester, 37 years old**

Lesson 2

There are knowledge gaps among harvesters regarding J-Palm's tree mapping feature and its purpose

Our survey found that 87% of harvesters were unaware of J-Palm's tree mapping feature. However, most harvesters expressed a strong commitment to preserving palm trees, citing their dependence on the trees for ongoing income. Additionally, 80% acknowledged the environmental impact of tree cutting. While harvesters generally do not engage in tree cutting, many indicated they would be open to financial incentives to further discourage deforestation. Conservation non-governmental organisations (NGOs) and the Forestry Development Authority of Liberia have already introduced such incentives in some communities.

Lesson 3

Harvesters are reluctant to use mobile money due to concerns around transaction fees

Only four per cent of the harvesters surveyed were paid for their palm oil and palm kernels via mobile money. Despite this, 78% of harvesters would be interested in being paid via mobile money, while 20% said they do not wish to be paid via mobile money, citing concerns such as potential transaction fees which may reduce their total income. J-Palm also conducted their own study on attitudes towards mobile money, and found low mobile phone penetration in the more rural communities they are working with – with mobile money itself being a nascent service in these areas.

Outcome 2: J-Palm helps harvesters to improve their financial stability

Most harvesters working with J-Palm choose to sell their palm oil to J-Palm. We surveyed some of the harvesters J-Palm works with to explore if the traceability app service was helping them to improve their financial stability, and found the following:

- 100% of harvesters say J-Palm is helping to improve their overall income
- 100% of harvesters say that J-Plam is helping them sell more product and avoid having large amounts of unsold stock
- 95% of harvesters say that J-Palm helps them to get paid for their products quickly

What's next?

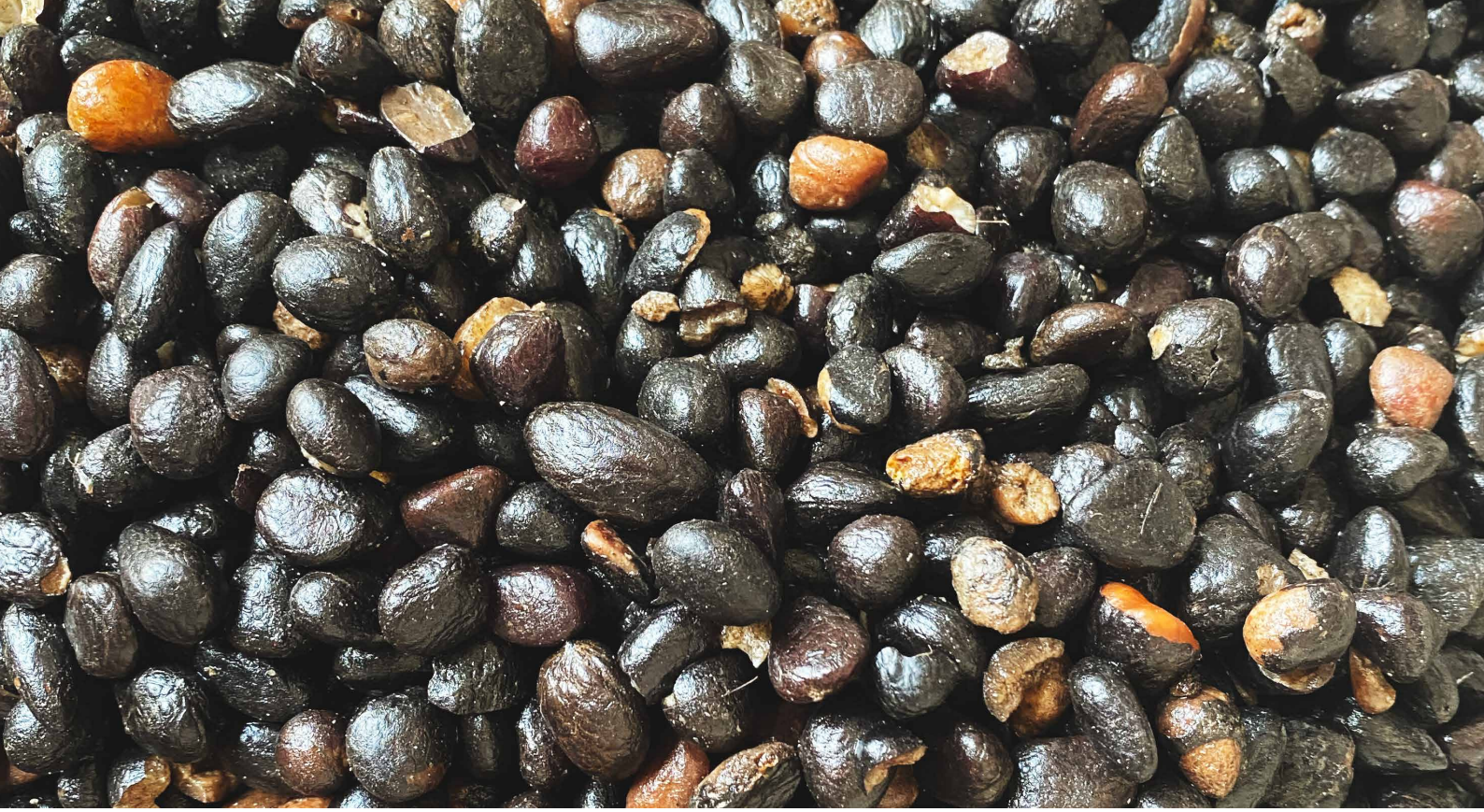
Strengthening commercial viability and looking ahead

J-Palm's reach grew significantly during the grant period. Following the grant, the company was able to unlock further funding, including a loan from the Whole Planet Foundation to support J-Palm's continued expansion into new communities.

In parallel with technological advancements, J-Palm has focused on capital expenditure improvements to drive long-term commercial sustainability. This has been exemplified through the construction of a new factory and offices, along with the expansion of its Kernel Fresh retail stores from two to eight locations. The Kernel Fresh retail stores sell cosmetic goods at a high profit margin and so far have significantly boosted revenue streams.

These investments and operational improvements have already yielded results. J-Palm's ability to produce at scale has not only improved earnings but also positioned it as a key player in international markets. The company recently secured a contract with a US soap manufacturer to supply 200 million tonnes of palm kernel oil.

As J-Palm continues to grow, it remains committed to leveraging technology and innovation. The company also plans to expand its tree health app to capture more data and improve long-term tree monitoring, enhancing its ability to manage sustainable harvesting practices.



Conclusion

With the support of the GSMA Innovation Fund for Climate Resilience and Adaptation, J-Palm has made significant strides in transforming Liberia's palm oil sector through innovative technology and sustainable practices. The successful deployment of mini mills and the development of digital tools like the traceability app have empowered smallholder farmers, improved agricultural practices and environmental outcomes, and enhanced supply chain transparency. By integrating these solutions with strong community partnerships, J-Palm has laid a solid foundation for long-term commercial sustainability and climate resilience, as smallholder farmers and wild harvesters now have the tools and knowledge needed to enhance their productivity in a sustainable manner.

Despite challenges with the adoption of the tree health app, J-Palm has demonstrated the strong potential of a scalable digital solution to build climate resilience and contribute to the long-term growth of Liberia's agricultural sector.

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