



Harnessing the power of the sun

Reducing post-harvest losses to support the livelihood of fishing communities around Lake Victoria

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MAVUNOLAB is a youth-driven initiative dedicated to reducing food loss and waste in Lake Victoria, Tanzania. Lake Victoria is a transboundary lake shared between Tanzania (51%), Uganda (43%), and Kenya (6%)¹. It is Africa's largest freshwater lake and the second-largest lake in the world². It boasts a prominent and productive inland fishery system, specifically with commercial species such as the Nile perch, Nile tilapia, and Dagaa, which are primarily exported to Europe³. In Tanzania, fishing-related activities

employ around 203,529 people, and four million people indirectly depend on it, making fishing a large economic activity⁴.

Lake Victoria is governed through regional and national frameworks involving Tanzania, Kenya, and Uganda. The key governing entities include the East African Community (EAC) framework, which includes the Lake Victoria Advisory Group (LVAG)⁵. The LVAG meets monthly to provide research-based support to policy-makers and resource managers for the sustainable management of the Lake Victoria Basin¹. The group includes the Lake Victoria Fisheries Organisation (LVFO) and the Lake Victoria Basin Commission (LVBC), regional bodies under the EAC¹. The LVFO manages cooperation among partner states and the Beach Management Units (BMUs), which are community-run fishery co-management entities^{1,7}. Since the 1990s, all individuals and organisations working in fisheries at a beach level must register with the BMU⁶.

A large proportion of the catch in Lake Victoria consists of Dagaa, the common name in Tanzania for the tiny silver fish essential to the livelihoods of millions of people^{4,8,9}. Since it is easily caught in large quantities, has a low price, and offers nutritional benefits, Dagaa has become a staple food for most people living along the lake, particularly those with lower incomes, and it is widely used in the military and schools^{10,11}. It is usually caught using artisanal and traditional methods, such as cast nets and gillnets. During the 1990s, Dagaa gained increasing popularity and importance. At this time, efforts were made to organise the value chain and activities around the lake, where women became the ones mainly responsible for post-harvest processing^{8,12}. Dagaa is traditionally dried through two different methods: sun drying or smoking. The free option is open-sun drying, where the fish is dried in the sand or by using raised beds (drying racks) that can be rented, allowing the fish to dry more quickly. However, both sun-drying and smoking carry health risks: smoking can lead to respiratory problems and contributes to air pollution, while drying methods can be inconsistent, with sand potentially contaminating the fish and abrupt



Implementing Organisation:

MAVUNOLAB (The Postharvest Innovation Centre)

Project name: Lake Victoria Fish Loss Prevention

Location: Lake Victoria, Tanzania

Stage: Implementing

Food system focus: Small-scale Fishing

Goal: To deploy affordable and efficient solar-powered dryers to up to 150 fish processors in Lake Victoria by 2027.

Key words: Solar-powered dryer, post-harvest losses, livelihoods, gender equality, small-scale fisheries



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weather changes, such as sudden rainfall, causing spoilage or reduced quality^{9,12-14}. If wasted due to rain or wind, or contaminated by sand, Dagaa can sometimes still be sold as animal feed¹⁰. If successfully dried, it can be sold at local markets and used in cooking, serving as a cheaper, tasty, and protein-rich ingredient^{8,15}.

It is reported that around 10-22% of the fish caught on the Tanzanian side of Lake Victoria is wasted, and Dagaa losses range between 14-22%^{10,11}. The losses result from a lack of access to technical solutions, high risks associated with sun-drying in increasingly challenging conditions due to climate change, and other organisational issues^{8,13,16}. Losses are usually highest during the rainy season, with rain events that can completely spoil fish or substantially reduce its quality. With climate change causing more erratic and unpredictable weather patterns^{17,18}, these risks are now present even outside the traditional rainy seasons. Loss and waste of fish have become a highly prioritised issue by government policies as it leads to increased food and economic insecurities and affects many working along Lake Victoria, foremost women who traditionally take care of the post-harvest processing¹⁵. In a recent FAO study, they identified quality loss as the main driver of fish food loss and waste¹³. They recommended a multidimensional approach that, among other things, prioritises gender inclusivity

and ensures equal opportunities for women and men, and addresses the ineffectiveness of the traditional sun-drying method and the lack of technology integrated throughout the value chain^{10,13}.

The fishing industry, and especially the Dagaa value chain, is coloured by gender inequalities. Men are often the only ones allowed to fish and sell at markets^{13,15}. While women are left to take care of the processing. Women need to borrow or purchase fish from men in order to process it. Once processed, the fish is sold by women back to men who sell it at the markets. This puts women at high financial risk as the processing and drying stages are where most loss and waste occur^{9,13,15}. Many initiatives are working towards different solutions to reduce food loss and waste in Tanzania, which will help tackle the coupled issues of food insecurity and gender inequality described above. The issue is becoming more urgent in light of the growing impacts of climate change and its effects on food loss and waste, particularly during the post-harvest stage.

MAVUNOLAB is one of the initiatives working on an innovative solution to these key challenges in the system. Together with others, such as Sokoine University, they are targeting one of the central issues of the system.



About MAVUNOLAB

MAVUNOLAB is a post-harvest innovation centre established in 2019. Their main objective is to create innovations that prevent post-harvest losses and reduce food waste in Tanzania, targeting small-scale farmers, food processors and traders. Farmers are engaged throughout the product design and development process to ensure affordability, alignment with their needs, and a focus on sustainability, with a particular emphasis on its impact on farmers' livelihoods.

MAVUNOLAB has four programs designed to address post-harvest challenges. The Post-Harvest Research and Product Development program conducts research that places farmers, local knowledge, food processors, and vendors at the centre to guide product design and development based on their needs. The Post-Harvest Training and Innovation Support program is a three-month program focused on supporting early-stage innovators in developing affordable solutions to reduce food loss and waste. This program focuses on capacity building, mentorship, and targeted support. The Post-Harvest Management and Food Safety program provides training on best practices in post-harvest management and food safety. Lastly, the Lake Victoria Fish Loss Prevention program leverages MAVUNOLAB's low-cost, solar-powered dryer to reduce food loss and spoilage in the Lake Victoria region.

In 2021, MAVUNOLAB introduced their solar-powered dryer for pilot testing among small-scale fish processors in the Lake Victoria region of Tanzania. The solar-powered dryer is designed for small-scale farmers or processors who want to dry fish, fruits, vegetables, or seaweed. In 2024, the solar-powered dryer could dry up to 250 kg in less than four hours. MAVUNOLAB has a goal of providing 150 fish processors around Lake Victoria access to their solar-powered dryer by 2027 to reduce fish waste. This work has been targeted at female fish processors as they make up a large portion of this workforce while also bearing the brunt of gender inequalities. In 2024, 100 female fish processors benefited from this initiative within two fishing communities in Lake Victoria.

Being a research and innovation lab, MAVUNOLAB, prioritises gathering locally rooted knowledge to inform its work. They conduct interviews and feedback sessions with fish processors and/or farmers to gather information

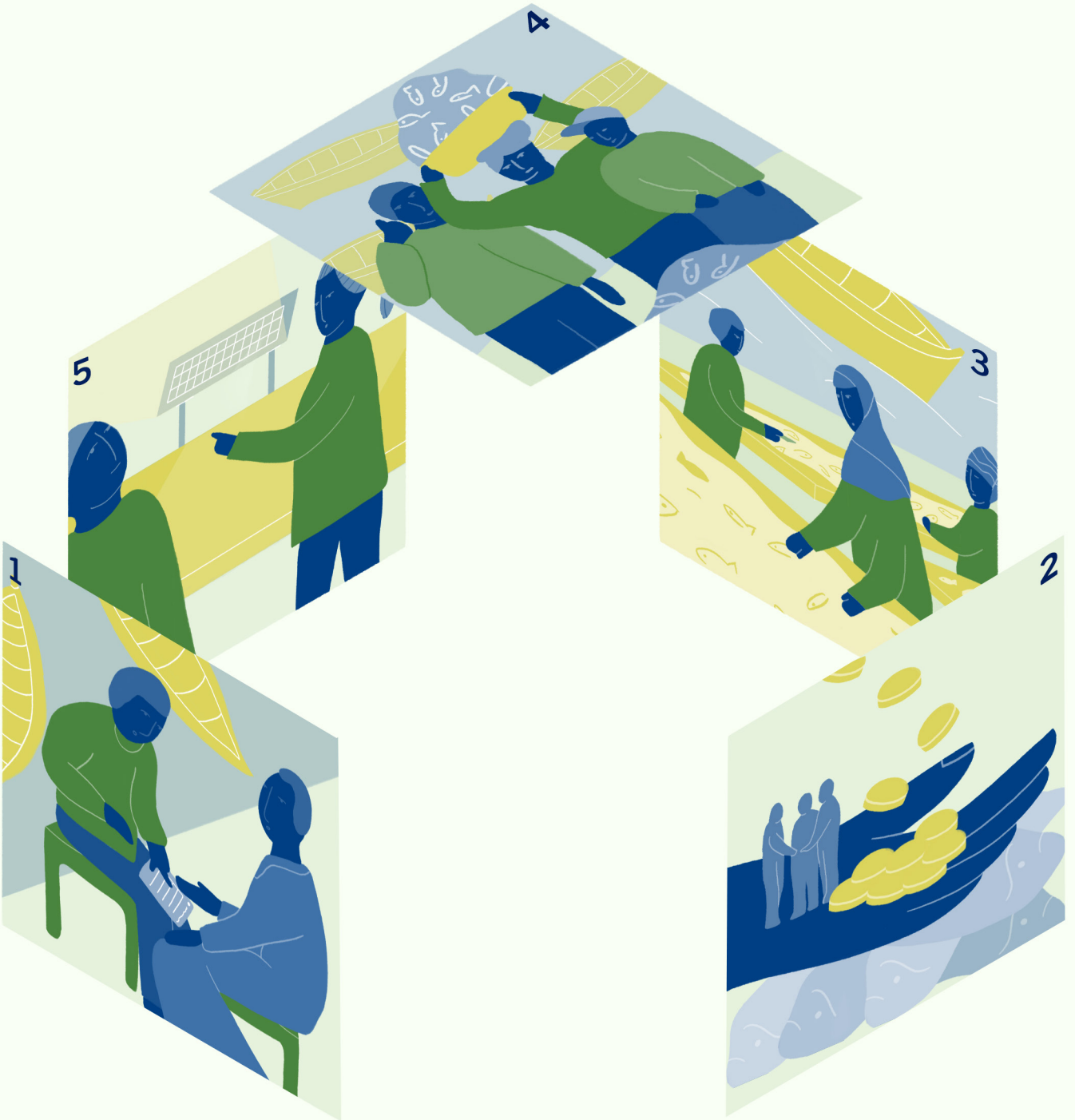
on the daily challenges and opportunities individuals face during the drying process. The information serves as a basis for improving the technology, making it more sustainable, and understanding the challenges associated with its adoption.

How does the MAVUNOLAB's Postharvest Innovation Centre contribute to transformative change?

The initiative has contributed to several dimensions recognised as enabling transformative potential. However, while their current actions address all of the framework's dimensions, this is manifested to varying degrees as their work focuses more on some dimensions than others. Importantly, the five dimensions of transformative potential we use in this analysis are not static, and actions that fall within one dimension can support others and even be prerequisites for them. This is reflected in how various factors can drive transformations¹⁹⁻²³. Through the Postharvest Innovation Centre, MAVUNOLAB focuses mainly on challenging existing power structures and norms while fostering and building the relationships and collaborations needed to support this work. The following sections will explore how the initiative takes action within its context and how its activities might contribute (or not) to the five dimensions of transformative potential.



Fig 1 Framework: Seeds transformative potential



Navigating a context that can enable or constrain action

1. Aligns with local and broader contexts

The initiative conducted a needs assessment before introducing its product to the community, informing them about its design. During the pilot phase of the solar-powered dryer in the Lake Victoria region, the initiative partnered with local BMUs (community-run fishery management entities) to connect with community leaders and introduce the dryer. The community leaders then directed the initiative to female fish processors within their community as their first point of contact. The initiative conducted individual interviews with each fish processor to gain a deeper understanding of their unique situations. They used a questionnaire to collect demographic information, identify challenges and opportunities, and assess awareness of alternative fish drying methods. The insights gained helped the initiative refine its approach, enhance the dryer's design, identify additional community needs, and prepare for potential challenges related to the adoption of the technology. The initiative also held feedback sessions to validate the information collected. In total, they interviewed 40 fish processors from two women's groups. The feedback revealed two key areas for improvement: the need for dryers that can dry more fish at once and the need to provide financing options to make the technology accessible to low-income fish processors. By engaging with community members and remaining responsive to their evolving needs, the initiative ensures that they align with the local context and community needs.

The initiative has faced a few challenges, including resistance to the technology among end users due to its novelty, finding ways to ensure the affordability of the dryers, and, lastly, the weather dependence of solar-driven dryers. The initiative has attempted to address these challenges by first implementing awareness-building activities on the benefits of solar-powered dryers, working closely with fishers to overcome resistance among those who struggled to understand what the dryer does and what benefits it could provide. Secondly, they are working on ways to make the dryer more affordable and accessible through various payment plans. Thirdly, while the innovation was created to address climate challenges such as unpredictable weather, its dependence on sunlight for power poses a limitation. To tackle

this, the initiative is developing solutions, such as integrating battery storage into the dryers. With these improvements, focusing on aligning with the local challenges, MAVUNOLAB aims to scale into new areas and markets, since several sectors in the food system face similar challenges related to food loss and waste. The initiative has identified the seaweed industry, for instance, which is heavily reliant on sun-drying, as a potentially fertile market for expansion.



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“We first spoke to the farmers or the fish community to identify the issue...Then we do individual interviews... we analyse that, and go to validate that data and provide feedback. And the last step, that's when we develop the technology itself, because we have feedback from them and understand how the technology can meet their needs.”

MAVUNOLAB

2. Is enabled by resources and support

Mavunolab makes use of both internal and external resources. The most essential internal resource for the initiative is the combined capacity and expertise of its team, which amounts to 20 years of experience. This wealth of expertise provides the initiative with a solid foundation that guides its direction, informs its decisions, and lends credibility to its actions. The team consists of members with advanced academic qualifications, including doctorates in areas of renewable energy and agriculture. The team not only bring technical expertise but also maintains connections to other professionals with specialised knowledge in solar power and food systems. One of the technical advisory board

members is a professor at Sokoine University of Agriculture, in the Department of Post-Service Engineering and Bioprocessing, Tanzania. This relationship is a useful resource for the initiative, expanding its academic networks and connecting it with universities and researchers. Furthermore, these relationships could lead to additional resources and support through the formation of new partnerships or collaborations, thereby enhancing the initiative's capacity.

The initiative also relies on external resources from the government, donor agencies, and other large non-governmental organisations (NGOs). Working with the local level of government has been less challenging than interacting with higher levels of authority. Their relationship with the local fisheries department has been characterised by smooth communication, readily offered support, and the department is proactive in facilitating introductions and expediting administrative or regulatory processes. The relationship has provided the initiative with tangible resources, including in-kind support such as infrastructure to work from and electricity. Beyond material support, the local government has played a crucial role in aiding the initiative by fostering trust and building connections with specific communities. One such example is the district government's introduction of the initiative to the Beach Management Unit leaders in a Mwanza region community. The introduction was crucial to building the community's trust, ultimately leading to their decision to collaborate with the initiative.

The initiative receives external funding from donor agencies, which enables them to refine existing innovations, explore new ideas, and test new concepts. These agencies' support goes beyond financial backing. They also serve as important connectors, linking the initiative to farmer groups where they can do on-farm demonstrations to raise awareness of their product. For instance, the United Nations Development Program, which recently introduced the initiative to small-scale farmers in Zanzibar, created an opportunity to test their solar dryer on seaweed. These organisations provide more than funding but act as bridges to new collaboration and opportunities. Social media is a valuable resource for the initiative, creating visibility and awareness for a global audience and attracting the attention of organisations with aligned interests (for instance, the UNDP found the initiative on social media). The digital footprint of MAVUNOLAB increases awareness while opening doors to potential partnerships and opportunities that might otherwise not have been an option.

Lastly, and intertwined with the initiative's alignment with the local context, the farmers and fish processors are invaluable resources and sources of knowledge for the initiative. They provide the initiative with information and a thorough understanding of their context and its challenges. This information helps the initiative improve its product, identify the challenges people face when using it, and understand the opportunities and challenges people face.



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“We try to avoid [higher levels of government] and go straight to the local government because you can go straight to the local government and be received. The bureaucracy level at the local government is very minimal compared to the ministry level. So that's what we do. We go to the fishery department at the district level.” **MAVUNOLAB**

Actions employed to navigate the initiative's context

3. Builds and fosters relationships and collaborations

As mentioned above, the initiative has faced several challenges as a new actor in its context. Building strong partnerships and relationships has been a strategy to counteract these issues. Their team has been instrumental in this effort, as their networks, experiences, and connections complement MAVUNOLABS' novelty in the sector. They have successfully engaged partners and collaborators through established relationships, such as those with

local governments. Positive relationships with the government have proven crucial due to their power and influence over the systems the initiative seeks to transform. However, encountering significant red tape and bureaucratic challenges has made the process time-consuming. In targeting local levels of government, the initiative has found fruitful ways to collaborate and obtain the necessary support; since the level of bureaucracy is lower, it makes collaboration at this level easier.



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“In Lake Victoria, we are collaborating with a special education and training institute... This is like a vocational training institute that trains ... young Tanzanians... who have finished their secondary school... So we try to engage young people from those colleges ... They come from the communities that we are working in. It's easy for us to collaborate with them. It's easy for them to follow up on our work. It's easy for them to help collect data.” **MAVUNOLAB**

A key partner has been the fishery department, which has enabled introductions to both fishers and various levels of government, fostering collaboration with key individuals. Since the team comes from Tanzania, their contextual understanding and previous experience with governments have been instrumental in helping the initiative navigate the political landscape. By engaging with local government levels, they can influence and establish partnerships with ministerial levels. To streamline these processes, the initiative has taken a proactive stance, focusing on early introductions to relevant local stakeholders and preparing formal

communications, such as letters, well in advance. Additionally, the initiative is aware of similar initiatives addressing food loss and waste across various sectors in Tanzania, as well as companies specialising in renewable energy, such as those working with solar panels, with which they could potentially collaborate in the future.

The relationships with the government offer additional advantages, including support for the initiative's long-term efforts. The initiative collaborates with government-run vocational training institutes, which connect it with middle- and high-school students in Tanzania who receive training in agriculture, food science, and technology. Many students come from the initiative's target communities, giving them firsthand insight into the challenges that need addressing. Through this collaboration, students can apply their knowledge and gain practical experience, while the initiative benefits from driven, qualified youth engaging with its mission. In some instances, ongoing partnerships with governments and NGOs have even lessened the initiative's reliance on funding. For example, with support from these partners, they have successfully reached groups in various areas of Tanzania that would have been difficult to access without their help. Their partners have facilitated the introduction of technology in new regions and among farmers, enabling the project's launch. In such cases, the initiative merely needed to fund a single employee to assist with the demonstration. This collaborative approach allows them to expand, even in the absence of immediate funding.

Other essential collaborations and partners to the initiative are UN agencies such as the FAO, who also work on fisheries and food loss projects in Tanzania¹¹ and have helped with introductions to their target communities. These types of introductions facilitate the trust-building needed for fruitful collaborations. Additionally, it has enabled the initiative to reach groups they would otherwise have had difficulty reaching. Similarly, collaborating with the local government facilitated their introduction and contact with the BMUs. Furthermore, the fishing communities, and, foremost, the women, are key to the initiative, and to collaborate with them, they leaned on the BMU. As the technology is novel, it needs to be introduced with care and trust, as people have been sceptical. The initiative has spent time getting to know the community and their needs to increase the adoption, which has proven successful.

A cross-sector collaboration that has been key to knowledge exchanges and learning is with Sokoine University of Agriculture. Sokoine provides access to broader research communities, enabling cross-scale research collaborations and knowledge sharing with researchers in Africa and at universities on other continents. The initiative's interview findings are used to create policy briefs or short summaries, which are shared with partners and the Sokoine University. The relationship with the university is a form of knowledge exchange, and the initiative has been invited to join a research project as a local partner. This partnership helps the initiative stay on top of new research and develop innovative concepts. At the same time, the information they gather from the communities provides the university with locally rooted knowledge to inform their work from a practical perspective.

4. Enables changes in power structures and norms

From the outset, the initiative was aware of the power structures and norms it would face when introducing its innovation. These dynamics include a strict gender-based division of labour, men's dominance in decision-making, and their control over resources and opportunities within the Lake Victoria fishing value chain. From the



“Their [women’s] livelihood will improve. They will not depend on anyone. They’ll be economically empowered. And that will take away the power imbalances, the power dynamics, and men will slowly lose control.” **MAVUNOLAB**

outset, the initiative focused on women because they play a critical role in the fish-drying process. Women collect fish from fishermen and process it through air drying or smoking. Due to their proximity to the process, women are exposed to health risks, such as respiratory problems from the smoke and other pollutants. Alongside this, women also possess the most knowledge about the losses and waste involved, making them an ideal target for the innovation. Although there was a clear reason for focusing on women, the initiative’s approach was received with some scepticism. This became evident when men were critical of the clear goal that 80% of participants in the needs-based assessment should be women. When the initiative presented the project to the BMU, the male members expressed a desire for the project and assessment to include them and feature male respondents. Consequently, the initiative encountered some resistance from the men in the fishing community concerning the decision to prioritise women in this process. It became apparent that men often take charge of community interactions and have control over resources entering or leaving the community. To address this pushback, the initiative engaged in strategic planning to ensure its goals could still be met. It included multiple discussions with the BMU to clarify that while women are being prioritised for this innovation, the initiative would ultimately benefit the entire community.

While the initiative originally aimed to reduce food waste from the fish-drying process, it became clear that their work also extends to contributing to women’s empowerment. Aiding women in gaining control over their daily lives, specifically their income. Women are often in a position where they need to borrow fish from male fishers to dry, and in some cases, they also have to rent drying racks, which are usually owned by men. This dynamic puts women at risk. If the fish is damaged by rain or contamination, the women are expected to repay the men who lent them the fish, leaving them in debt. The introduction of the solar dryer challenges men’s power in the value chain, as it enables women to take control of the drying stage, thereby breaking free from their dependency on men. Not being subjected to the risk of food loss and waste also prevents women from ending up in debt, which sometimes forces them to resort to harmful coping mechanisms, with the risk of being sexually abused. Solar dryers empower women to control the drying process, reduce the risk of debt, and enable products to be sold at higher prices in markets. It is a way of empowering women and creating avenues through which they can decrease their dependency on men.

Gender dynamics have also come into play in the seeking and fostering of collaborations for the initiative. They have recognised that being male, while also being from outside the community, has contributed significantly to others' willingness to collaborate with them. They have found this to be true in their relationships with the local government and when introducing the innovation to the fishing community. The initiative highlights that if they had not been men, there might have been even more resistance to targeting women, specifically during the needs-based assessment and trial periods.

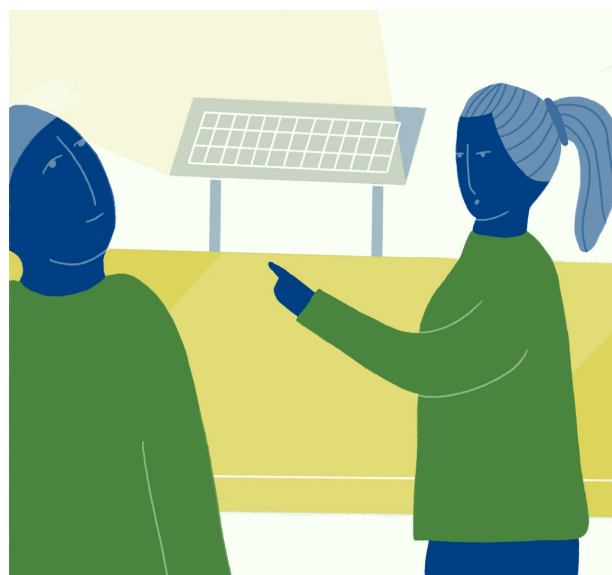
5. Supports learning and systems understanding

To reach more people, the initiative focuses on education, demonstrations, and continuous learning. As mentioned above, the innovation is novel, and due to this, there have been community members who are sceptical of the solar dryers. Because people have used traditional drying methods for centuries, they are accustomed to them, and it can be difficult to replace them with a completely new method that is also perceived as costly. There have been questions about how it works, whether it can dry, and how expensive it would be. This has made the adoption slow. But by listening to these concerns, focusing on demonstrations and education, and experimenting with different ways of financing solar dryers, the initiative is trying to move past these challenges.

As mentioned earlier, before developing and introducing the first versions of the solar dryers, the initiative conducted needs-based assessments. They spoke with the BMUs, community leaders, and women to learn about the context and the challenges they face. They conducted pre- and post-intervention evaluations through interviews to understand their experiences. The pre-interviews focused on questions about food waste and loss, including how much fish people are losing and at what stages. How much does that cost them? This knowledge helped the initiative design the solar dryer technology and determine its size and capacity, ensuring it meets the community's needs. It has also enabled them to estimate how much money people lose when using traditional drying methods and to ensure that dryers remain the cheaper option. After analysing the pre-interviews, they return to the community to provide feedback and ensure they have an accurate understanding of the system, context, and challenges, as this will

inform the development of the solar dryer. The entire initiative has been developed based on the needs assessment results and the initiative's understanding of the system, and continues to be adapted and improved based on community feedback in a continuous learning process.

They engage in knowledge exchange by sharing their results with partners and by working with



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“We can demonstrate to them, you see, this one works really well, whether it's raining, whether it's not raining. I think there will be an adoption of the technology really fast... But we're also trying to address the problem of affordability. We are trying to come up with some very innovative ways that are going to be suitable for low-income farmers..” **MAVUNOLAB**

youth through government training institutions, where youth are trained in subjects ranging from food production to agro mechanics. Upon graduation, youth are welcome into MAVUNOLAB's programs, where they receive additional training and participate in research. The insights gained from the initiative are shared in policy briefs rather than lengthy papers, making them easier for participants, government officials, and other stakeholders to digest. Additionally, these learnings are shared through email lists, conferences, online calls, seminars, and webinars. The findings are shared with the Sokoine University of Agriculture, which helps them spread the knowledge to new partners and academic audiences worldwide. Through this learning collaboration, new opportunities are created for the initiative, with invitations to seminars and webinars to showcase their work.

Transformative potential of the initiative...

1. Aligns with Local and Broader Contexts

Aligning with the local context

- Conducts needs assessments to guide their work
- Conducts individual interviews with fish processors to inform their product development and support
- Uses established structures and networks to reach the community. (dept Fisheries and BMU)
- Participates as a local partner in research projects
- Aligns with local challenges to improve uptake and design relevant solutions

2. Is Enabled by Resources and Support

External resources and support

- Fish Processors and Farmers' perspectives, knowledge, and experience
- Government in-kind support, such as electricity and infrastructure
- Vocational training institutes that provide young people with work
- Large donors provide funding and access to farmer groups

Internal resources and support

- Team members with a combined 20 years of experience (allowing for broadening networks, connection to universities, and combined expertise). Their internal technical expertise allows them to update and improve the technology.
- Uses social media to build visibility and attract partnerships



Transformative potential of the initiative...

3. Builds and Fosters Relationships and Collaborations

Peer-to-peer relationships and collaborations

- Close collaboration with Lake Victoria communities -small-scale fish processors, and also small-scale farmers
- Mutual collaboration with existing community-based groups

Cross-sector relationships and collaborations

- Collaborations with Sokoine University
- Partnerships with UN agencies for funding and introductions to fisher groups
- Ongoing collaboration with government-run vocational training institutes

Cross-scale relationships and collaborations

- Partnership with local government (BMU Units)
- Partnerships at local levels to indirectly influence the regional or national levels of government

4. Enables Change in Power Structures & Norms

Navigating power structures and norms

- Engaged with BMU to seek approval and support for the initiative, knowing that men control community-level resources
- Engaged in multiple discussions with male leaders to attempt to ease resistance
- Strategically balancing male expectations while keeping to the project goals
- Use of gender and cultural privileges to navigate gatekeeping norms. The initiative made use of how being a “man” has the privilege and sway in getting projects off the ground. Additionally, they also made use of how being an outsider affects community perception.

Actions that challenge power structures and norms

- Raised the voice of marginalised groups (women). ex: 80% of needs assessment participants were aimed to be women
- Clearly set women as central actors in the project (main users of the solar dryer)
- Economic empowerment of women and youth to process fish more effectively and efficiently, to become more independent of men



Transformative potential of the initiative...

5. Supports Learning & Systems Understanding

Community-centered understanding

- Conduct needs assessment and interviews to guide the design of technology
- Used post-intervention evaluations to refine the technology
- Listened to concerns about the cost of the dryer and engaged in experimentation based on learning around financing models for the affordability of the dryer
- Created community demonstrations of the solar dryer to address misconceptions and lack of trust around it

Knowledge sharing

- Produce policy briefs, one page reports summarising significant findings, which are shared with partners
- Share learnings through email lists, conferences, online calls, seminars, and webinars
- Collaborates with University partners to share and exchange knowledge
- Collaborates with the government training institutions to engage the youth



Pathways forward

There are many different ways to address food loss and waste at various stages of the food system, and it has been highlighted as a key area for improving sustainability^{13,24,25}. MAVUNOLAB focuses on preventing food loss and waste through its interventions early in the supply chain. Compared to other initiatives on food loss and waste, they focus on prevention rather than reuse, recycling, or repurposing. From a circular economy perspective, this approach has a greater transformative potential^{24,26}. However, the initiative has struggled with the solar dryers' capacity to work effectively regardless of the weather, much like traditional drying methods. Continuing research and development together with their partners will be critical to ensuring that the innovation can complement and compensate for situations where traditional drying methods are ineffective. The inclusion of battery storage in the dryers would be an important step to overcome these limitations. Equally important are the continued efforts to make solar dryers affordable, which will also be key. Research suggests that the cost and affordability of innovations are crucial for their widespread adoption and positive impact²⁷. High cost can act as a significant barrier to the adoption of new practices and can exacerbate existing inequalities^{27,28}. Therefore, successful transformations require strategies that either reduce costs or create mechanisms to ensure equitable access for all, particularly low-income populations. In this regard, external resources and funding can play a critical role, as they can support communities seeking to acquire a dryer.

In essence, MAVUNOLAB offers a technical innovation that can help reduce food loss and waste. However, what sets the initiative apart from simply delivering a technical innovation is

the way they have designed the structure for development and implementation. Working closely with women and the wider community, MAVUNOLAB also offers a social innovation for addressing inequalities and unequal opportunities. The combination of social and technical innovations can often reinforce each other, ensuring that the benefits of the technical innovation contribute to societal benefits^{27,29}. MAVUNOLAB's focus on innovating fish drying practices in Tanzania has a strong emphasis on empowering women as central actors in the fish value chain. By improving traditional drying methods and supporting women-led enterprises, the initiative addresses critical challenges, including post-harvest losses, limited market access, and gender inequality.

Going beyond technical solutions, they work through partnerships, collaborations, and relationship-building with local communities, researchers, and policymakers. By intentionally including women in decision-making and capacity-building activities, the initiative challenges existing power structures and social norms that have historically marginalised women in the Lake Victoria region. Challenging power structures and norms in ways that contribute to transformation can involve "changing the rules of the game" to support those who have been disadvantaged by the system in place^{30,31}. To some extent, this is what MAVUNOLAB is doing by prioritising women's access to their innovation, empowering them and increasing their agency^{30,32}. As the initiative improves and aims to scale, maintaining and strengthening this work will be essential to MAVUNOLAB'S' transformative potential.



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