KENYA BANKERS ASSOCIATION

Business Opportunity
Case Study

Innovation in Social Technology for Agriculture: New Opportunities for Finance

The Case of InspiraFarms Solar Cooling and Bloom Growers, Nanyuki

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ABSTRACT

With up to 50% of smallholder farmers' produce lost in post-harvest processing[1], the challenge of improved food security and returns from the agricultural industry is less about boosting agricultural yield than solving the critical problem of loss. This case study examining innovation in the solar technology space, and one farm's use of solar cooling system to reduce loss and boost returns to their company, employees and environment alike, speaks to the type of innovative technology solution needed to solve food security and green the industry. It illustrates the impact that solar technology can have in substantially improving the yield, reliability shelf life and quality of agricultural products, and therefore returns to companies, workers and clients. A climate-friendly, zero emission technology, solar cooling's potential to transform the agricultural sector however remains inhibited by limited access to finance. This case study also considers the role banks can play in supporting investment in solar cooling technology so that financial barriers to adoption can be reduced to support widespread adoption of solar cooling technologies in Kenya and throughout the region.

The Problem of Food Waste

Agriculture is the largest employer in Kenya, with over 50% of adult Kenyans earning their livelihoods from the sector in 2020[2]. With most Kenyan families and communities relying on agricultural yield to meet their daily needs, it is surprising such enormous levels of losses incurred by the sector have been largely overlooked. With anywhere from 30-50% of produce[3] never making it from field to market, due to a range of issues from production and

[1]See https://onlinelibrary.wiley.com/doi/full/10.1002/fes3.195

[2] Share of employment in agriculture in Kenya, 2010-202 Julia Faria, Mar 8 2021 Economy & Politics

[3] https://agfundernews.com/sokofresh-offers-cold-storage-market-linkage-to-minimize-africas-post-harvest-losses

processing failures to transportation and market and labour coordination problems, the problem of agricultural waste undermines the productivity of Kenya overall. Where production and processing failures are the root cause of waste, cooling of produce at the point of harvest can be a significant strategy for reducing loss and boosting returns. At the point of being harvested, products are still imbued with field heat or the life force of the plant which if not rapidly removed, will hasten the decompensation process, reducing the shelf life of the plant and shortening its runway for reaching market. Taking the plant immediately from the ground to a cooling facility can enormously lengthen the life span of the product and the range of customers it can serve. Cooling is therefore a critical strategy in boosting yield and returns in agriculture, families and the economy overall.

InspiraFarms' Solar Cooling Solution

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InspiraFarms is an [illegible] refrigeration company [illegible] both solar and non-solar cooling solutions to agricultural companies. With offices in Nairobi, Harare, London and Perugia, partners in Ghana and a particular focus on the African market, InspiraFarms designs, develops supplies and maintains customized modular and energy-efficient on-farm and close-to-farm cold rooms and packhouses for exporters, aggregators and horticultural companies. All of InspiraFarms' solutions are designed to minimize food losses, maximize shelf life, reduce OPEX and give access to data in order to both maximize ROI and deliver a broad range of benefit to the planet, economy, community and growers overall.

With the majority of InspiraFarms' target market and potential customers operating off-grid, its solar-powered cold storage systems aim to replace low efficiency refrigeration often powered by diesel powered options that are easy to procure but expensive to run – while emitting significant levels of carbon into the atmosphere. When cold rooms are powered by solar technology, operating costs due to diesel are eliminated, and their carbon footprint is cut down. Moreover, with efficient cooling systems to rely on, the time available for farms to get their products to markets is extended, allowing farms to be more selective about which markets to target, and to negotiate for more higher paying, far flung customers than ever before. Given the huge impact that cooling can have in reducing post-production loss and boosting agricultural farm revenues, the primary reason that large-scale cooling solutions remains low is largely because they are quite expensive, and hard to find flexible financing for. The cost of solar cooling devices will depends on the size and usage needs but would typically start from $20,000 USD, making such high value assets remain mostly only within reach of more established clients, who likely bundle solar cooling systems into larger installations providing lighting from solar power as well, resulting in a sizeable investment

that may have a 2-3 year payback period[4]. Without financing such as what InspiraFarms provides, clients struggle to afford these expensive but transformative units outright. As such even though the technology has the potential to transform returns and reduce environmental and social impacts alike, uptake remains slow.

Bloom Growers

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mily-owned agricultural company located in the outskirts of Nanyuki, off the grid. Bloom Growers' specialization is the cultivation of culinary herbs, including basil, tarragon, thyme, sage, mint and lemon thyme. Even while growing relatively resilient products, Bloom Growers was nevertheless frustrated by the level of product lost or rejected by customers, sometimes up to 66% of their harvest, due to temperature issues. With such extreme levels of loss, Bloom Glowers and was looking for cooling solutions to preserve product for market and boost their agricultural yield and returns. They originally approached Kenya Power to enquire about the cost of extending the national power grid to their farm, but found the quote they were given - which included establishing a dedicated transformer for their premises alone - far beyond their reach. As such, they settled on a do-it-yourself solution, consisting of a sealed room cooled by an adapted AC powered by diesel generator, which they used for several years. While this home-made system was able to cool a 4 m² packing room to around 8-10 °C, the system was less than ideal. First of all, the costs of running the facility with diesel generators were high - around $500-600 USD per week. Secondly, with the generator unreliable, they needed to maintain two generators – one on standby – just in case the main one failed, pushing up costs. Thirdly, the generator-powered AC system could only cool a small room, with the space too limited to hold all products needing cooling. And finally, the cooling process was not very efficient, taking too much time to reach the optimum temperature, which meant that it took several hours for product to be cooled to the level required to stave off product decomposition during transportation. Given its high operating costs, limited capacity and efficiency of process Bloom persisted in looking for a better solution to full meet their cooling needs. This led them to InspiraFarms.

InspiraFarms visited Bloom Growers' farm to understand their operations and needs, so that a customized solution able to meet their production needs could be designed and constructed. Their proposed solution consisted of a 25 m² cooling room, far more spacious than their homemade set up, which was able to keep up to 4 tonnes of fresh produce at any one time, at a consistently cool temperature that it could attain much quicker than the old

[4] Payback is dependent on multiple factors, such as the changing cost of inputs, labour, power, local transport, freight, among others. Reducing loss of produce however is the greatest determinant of a quicker payback period, as reducing loss directly increases revenues.

system could. Having more space meant that harvesting and storage process could take place daily, rather than limited to biweekly cycles built around the transportation to market cycle. According to Juliet Kariuki, the General Manager of Bloom Growers, the benefits of InspiraFarms' dedicated solar cold room have been enormous, and included:

- **Reduced cost of cooling**. By using the energy of the sun for cooling, they incur minimum operating costs, compared to the high costs of diesel they used to incur.
- **Improved efficiencies**. The new cold room is more efficient than the old solution in reducing field heat. The old system took 6-7 hours to fully reduce the 'field heat' from the plants before processing was possible. However with the new system they company can get to the optimum cooled temperature in just 30 mins, at which point produce can be packed for market, increasing the rate of turnover significantly.
- **Improved quality - and returns.** Another huge benefit of efficient, rapid cooling is improvement in product quality. Previously, the substandard cooling system meant that product shipped could rot by the time it reached the customer, leading to rejection and revenue loss to company. At worst, 2/3 of product might be rejected outright. Previously, the lowest level of rejections they could often hope for were 20%; now 0% is often achieved, transforming returns to Bloom Growers.
- **Increased market reach – and returns**. With more efficient cooling, the company can get product to customers further afield who are willing to pay higher prices for premium product. The increased market reach improves returns.
- **Improved reputation**. When a company can ship more reliable, quality product – their reputation and ability to retain (higher paying, more reputable) customers grew.
- **More skilled, reliable labour.** Previously, unreliable cooling systems meant that harvesting had to be timed around the biweekly transport of product from the farm to market. Product could not be picked every day – even if it was ripe and ready – because without reliable cooling, it would simply rot on the farm before it could be transported to market. The lack of cooling was not only ill-adapted to the production cycle of the plant; it had knock on effects on labour as well. With pluckers hired sporadically, it was difficult for Bloom Growers to build a sense of loyalty or professionalism amongst their workforce. With cooling and storage capacity, however, it became possible to give pluckers certainty of employment, which improved worker reliability. Having them work consistently also improved their plucking skills, further boosting quality of product – and returns.

Overall, with all those benefits in mind, while the cost of setting up the unit was higher than their makeshift cold room, Bloom Growers understood that the trade-off between lower upfront cost and life time cost made the the Inspira cooling system an extremely worthwhile investment. With savings and returns from reduced losses, minimum zero operating costs, and elimination of rejections from customers so significant, even with a projected 5 years repayment period for the Inspira Farms cooling technology, Bloom Growers struggled and saved to raise finance to purchase the unit.

HOW SOLAR COOLING BOOSTS REVENUES FOR BANKS: A TYPICAL SCENARIO:

Inspira Farms provided an illustrative financial scenario of how cold chain can improve agricultural returns.

	Existing	**With Solar Cooling**
Production Kg	1000	1000
Price per Kg	3	3
Losses (temperature)	40%	10%
Revenue	1800	2700
Total Variable Costs	1000	1000
Variable Cost per Kg	56%	37%
Gross Profit	800	1700
Diesel	300	0
Other Fixed Costs	200	200
Net Margin	300	1500
	17%	56%

Beyond savings from internal production costs, the final net margin could be further improved if better quality led to customers willing to pay higher prices for the product, or if stable employment led to improved professionalism of workers and a reduction in variable costs per kilo. Ultimately, in an increasingly challenging economic environment, every advantage a farm can enjoy to keep ahead in a competitive market become vital to its business and the community who depend on it.

TAKEAWAYS FOR BANKS

The case of Inspira Farms and Bloom Growers represents a compelling example of how innovation in solar technology can transform returns in the agricultural sector in a climate-friendly way. With the need for agricultural cooling so pressing, and the technology proven to be reliable, the only obstacle standing in the way of wider adoption is ultimately the lack of customized finance support that could enable prospective clients to purchase solar cooling systems with repayment terms they can be confident to meet. With the market opportunity palpable, taking bold moves to support the evolution of innovative technology products such as solar cooling is compelling – all the more so given the pressure on banks to report on how their financing is taking climate change. If banks are to be part of the solution in lowering financial barriers preventing agricultural companies from adopting solar cooling, they will need to consider adapting their asset financing terms in various ways, including:

- While the quality of the technology is new, standard Know Your Customer (KYC) due diligence processes need not fundamentally change. At heart of reducing risk, getting to know who the prospective client is, what they will use the loan for and the cash flows for repayment remain critical.
- Replacing linear payment schemes with alternatives that reflect the seasonal realities of agricultural returns, so borrowers can pay back more during harvest periods, and less when product is in a growing cycle.
- Accepting alternative forms of collateral, such as export contracts with clients, and cashflow statements over assets.
- Accepting that a long payback period does not necessarily mean additional risk, if the technology is proven, returns are greater, operating costs are reduced and the market will pay more for product grown in a climate-friendly way. Banks may need to become comfortable approving loans based not on existing cash flows but projected cash flows, possible only once solar cooling systems are in place; not before.

The future of finance is competitive and evolving, with digital platforms increasingly competing with traditional banks to meet clients financing needs. Banks must therefore be highly conscious of the fact that they may not always be the source of innovation in financial products. If bank processes remain too onerous and expensive to navigate, clients wishing to buy solar systems may increasingly turn to private capital backers for support, excluding bank capital from this growing market opportunity. For banks to remain at the forefront of financial innovation and market trends, they will need to develop internal systems and incentives that seek out, package and publicize new investment opportunities through the bank value chain. By so doing, they will not only enhance their green lending portfolio and reputation, but remain viable in an increasingly climate-leaning market and world.

For more information on solar cooling, please consult Module 3: Solar Cooling, and watch the video on Inspira Farms found in this module. More information on Inspira Farms can be found on their website.