SCBF 2018 - 04 **01.04.2022**

Customised loans to smallholder farmers for solar powered water pumps

1. DEVELOPMENT RELEVANCE

Economic and poverty context

Tanzania counts a population of 58 million (2019). The GDP per capita reached USD 1'076. In 2020, the World Bank declared the rise of the Tanzanian economy from low-income to lower middle-income country. Still, approximately 49% of the population live below the poverty line of US 1.90 a day. The country has made some progress towards reducing extreme hunger and malnutrition. According to the 2021 Global Hunger Index (GHI), Tanzania has a GHI score of 24.7, depicting serious levels of hunger. 25.1% of the population is undernourished, and at least 5.1% children die before reaching the age of 5.

Table 1[1]: Population and economic indicators	
Population in million (2019)	***58***
GDP growth *(2020)*	**2.0%**
Inflation *(2020)*	**3.3%**
Trade balance (% of GDP) *(2020)*	**-1%**
Foreign direct investment (net) (% of GDP) *(2019)*	**1.6%**
Net ODA received (% of GNI) *(2019)*	**3.5%**
Remittances received (% of GDP) *(2020)*	**0.7%**
Economic Freedom Index[i] (Rank among 186 countries) *(2021)*	**61.3**
Poverty indicators	
GDP per capita (USD) *(2020))*	**1'076**
Gini Index (0= equality 100= inequality) *(2017)*	**40.5**
International poverty rate *(2017;* at 1.90 USD/day)	**49.4%**
National poverty rate *(2017)*	**26.4%**
National rural poverty headcount rate *(year)*	**n.a.%**

There are few resources for Tanzanians in terms of credit services, infrastructure or availability of improved agricultural technologies. The most prominent challenges Tanzania faces on poverty reduction are unsustainable harvesting of its natural resources, climate change and water resource encroachment, according to the United Nations Development Programme (UNDP).

Financial-sector context

The blueprint of Tanzania's inclusion vision is the National Financial Inclusion Framework (NFIF). When this project was launched, NFIF for 2014 – 2017 was in place, with a financial inclusion goal of 80% of Tanzanian adults using a financial access points and 70% of population living within 5 km of a financial access point by 2017. These goals were partially achieved. The NFIF for 2018 – 2022 states that only 65% of adults used banks or other formal financial services in 2017. However, 86% nationally and 78% in rural areas lived within 5 km from financial access points. By 2022 the goal is to reach 90% nationally, and 85% in rural areas.

The regulated part of the financial sector comprises banking (67 institutions, 813 branches, 5814 bank agents, 2 credit reference bureaus), insurance (31 companies, 115 brokers, 472 insurance agents), pension (5 public pensions funds), securities (1 stock exchange, 12 brokers/dealers, 4 custodians, 6 bond traders, 16 investment advisors, 8 fund managers, 2 nominated advisors) and non-bank payment service providers (13 electronic money insurers, 398'094 agents). A total of 5'640 Savings and Credit Cooperative organisations (SACCOS) on the mainland and 231 in Zanzibar complete the count. Microfinance institutions (MFIs) and community groups make up the non-regulated sector (*source: NFIF 2018 – 2022).*

The Finscope Report on Dedicated Farmers (2017) gives detailed insights on penetration rates for main financial services among farmers. Only 47% of farmers save some money. Nearly half keep the saved money at home. 23% use mobile money as a savings device. The rest rely on savings groups and banks. Borrowing is mostly done from family and friends (73%) followed by savings groups (18%). Despite the growth of financial inclusion, very few famers use formal financial services to finance farming inputs or equipment.

Partner financial institution/s

Biashara na Fedha (VSK) Limited, an affiliate of Venture South International, is a specialised lender to SMEs active in the solar energy space, and renewable resources. Based in Kenya, it is an impact investor that seeks to establish commercial lending to SMEs with a compelling business model. It provides finance in the form of collateralised, asset-backed loans, loans for inventory and short-term liquidity.

[1]The World Bank Group (2022). World Development Indicators database. Washington, DC. http://data.worldbank.org. Accessed Jan 2022

Biashara is the majority shareholder of Venture South Uganda Limited (VSU). VSU replicates the same lending model to the Ugandan solar sector. It is also active in agri-finance, specifically warehouse financing (a form of inventory financing).

Simusolar Limited (Tanzania) and Tulima Limited (Uganda) are affiliates of Simusolar, Inc. (USA). The companies distribute, sell and service solar-powered agricultural equipment (solar water pumps – the "specific asset "of this intervention and solar fishing lights). It sells to farmers on a cash basis as well as under a lease-to-own model.

2. INTERVENTION APPROACH

Capacity-building needs

Lack of finance is a recurring problem for SMEs, in particular for young companies in emerging economies such as Tanzania and Uganda. Commercial Tanzanian banks and MFIs provide very limited finance to the solar sector. Therefore, this project explored the opportunity to establish commercial lending for solar for productive use in the agriculture space in Tanzania.

Solar-powered water pumps (SWPs) was an almost completely new product in the market, when Simusolar set out to build up distribution, servicing and developing the pay-as-you-go (PAYGO) functionality for SWPs in Tanzania.

Main activity areas (goals, targets, resources & time frame) and outputs

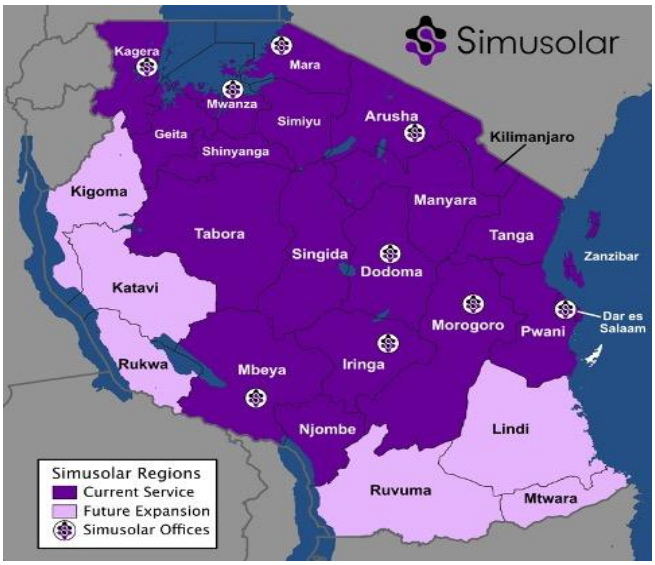
Biashara na Fedha (VSK), a Kenyan entity, developed the contractual framework for lending to Simusolar, which is based in Tanzania. We initially developed a collateralised, revolving credit facility. Its contractual complexity proved to be a problem for obtaining the required approval of the contract by the Tanzania Central Bank (TZCB). Without TZCB's approval, the cross-border repayments to Biashara could not be done, and funds had to remain reinvested in SWPs until this hurdle was cleared.

The first agreement was subsequently replaced with a more standard loan agreement in Tanzania, which helped to clear the hurdle with TZCB. A separate agreement between VSK and Simusolar, Inc. (US parent company) accommodated performance-based incentive payments (essentially sharing collection proceeds above a minimum threshold) agreed between the companies.

The effort to develop a receivable-based contractual framework was not lost though. We have used it with other clients in Kenya, where no such issue exists with the Central Bank.

Simusolar designed the underwriting process of SWP clients, the tools to digitise underwriting, technical service, and distribution. At the end-user (smallholder) front, a number of customised financing arrangements were tested, including fixed instalments, repayment periods tailored to harvests, variability of financing period and size of down payment.

Simusolar projected sales of 160 units in 2018 (actual 74), 438 units in 2019 (actual 202), 480 units in 2020 (303, of which 71 were in Uganda) and 750 units in 2021 (actual 418, of which 113 in Uganda). The lower volume of actual highlight the difficulties of marketing a new product and the impact of an unexpected pandemic. Tulima Solar Ltd., Simusolar's affiliate company in Uganda, initiated operations in late 2019. Uganda's economy is more developed that Tanzania's, with a strong focus on agriculture, which contributed to the SWP sales.



Simusolar distribution network

3. RESULTS ACHIEVED AND NOT ACHIEVED

Client-level

Client satisfaction, among a number of other outcome indicators, has been measured for three years since 2019 with the 60 Decibels Survey (Acumen Lean Data). Simusolar's customer-base is predominantly poor: 67% of clients are below the poverty line of USD 3.2 per person per day, compared to the rural rate of 82%, and the average land irrigated is 1.7 hectares. Non-customers were also surveyed. Their responses are very interesting and valuable to understand the issues and then adjust marketing, distribution and service. Both customers and non-customers were typically male, of similar age, and had a similar income profile, and own and/or irrigate land of similar acreage. These surveys were done in Tanzania.

Farmers consistently indicated that financing was key to their purchase, with 90% indicating there was no alternative to Simusolar. Under 2% of customers had prior access to a solar pump, while only 3% of customers reported having access to an alternative to Simusolar's financing plan.

According to the survey 2021, 67% of all customers said their life had "very much improved" or slightly improved". Increased land in use, higher productivity, and more harvests per year were listed as key factors.[2]

The primary economic benefits reported were savings in time and money, including the cost of fuel, as 54% of customers used a fuel pump before Simusolar and 21% a treadle pump. Over half of the customers (56%) experienced increased incomes with 18% reporting at least a 50% increase and 22% reporting an increase of 25 to 50% due to reduced costs (64% of respondents).

72% of the farmers reported increased farm productivity. 71% of this group realized the increase without cultivating additional land. 29% reported increased production due to increased area under cultivation, indicating expanded capabilities (higher watering efficiency).

Acquisition of an SWP lowers the dependence on rain-fed irrigation, as indicated by 64% of farmers irrigating all of their land using the SWP last year.

"We no longer use a lot of energy to get water. I have increased my income through selling vegetables. This income helps my children to get the pocket money for school, and also serves the home basic needs like food."

Zena Nyamagwira, water pump user

58% of the spouses indicated that their work burden had decreased (48% reported a huge reduction) with the pump. Women often bear the burden of manual watering in the household, taking up much of their time that could be used for other income generation or life-improving activities.

"Simusolar is a wonderful company and it helps a lot of people. For me getting clean water was a problem but now my kids don't have to walk a long distance to get water."

Female water pump user

"Since I have started using the solar water pump I have expanded my activities. Instead of just farming flowers as I did before, now I can manage to irrigate a large area and have other crops on my farm."

Pantaleo Kuyenga, water pump user

[2] 60 Decibels Survey 2021 interviewed 498 respondents, of which 232 were active customers of Simusolar (18% women), 40 inactive customers, and 226 non-customers.

Steady flow of water using SWPs for manual irrigation

Set-up and demonstration of SWP

Traditional way to collect water

The net promoter score (NPS) is a gauge of satisfaction and loyalty. Anything above 50 is considered excellent. Simusolar's latest measurement showed NPS 42, which is above the East Africa average (38), agriculture average (30) and slightly lower than the energy average (45). Only 37% of the customers reported experiencing challenges with using Simusolar water pumps. Customer service, increased pump pressure requiring stronger, larger motor and hence more power, and a need for batteries or inverters to make up for the lack of sunlight during cloudy days were the most cited challenges.

Non-customers are interested in the pump as well, but indicated affordability as the main issue in their decision to purchase. Affordability, longevity or durability and warranty/servicing are the top three factors considered when making a decision. These are areas for Simusolar to improve its NPS.

Avoidance of CO2 emissions by employing SWPs is a measurable metric of employing this technology. Based on the 60 Decibels survey data, Simusolar estimates that of the 1'000 units sold, 700 have replaced pumps run previously with diesel generators. CO2 emissions are assessed at 5.36 tonnes/year/ pump. Therefore, **the 1'000 SWPs sold translate to 3'752 tonnes of CO2 emissions avoided per year.**

Partner-financial institution level

Biashara aimed to pioneer (i.e. design, test and scale) lending to a solar company focused on solar equipment for productive use in agriculture. Simusolar launched distribution of solar water pumps in Tanzania around the project start in 2018. At a later stage, the project scope was extended to include its operations in Uganda.

Project goals achieved include:

- ***Execution of cross-border lending***: Biashara did not have an office in Tanzania. Lending to Simusolar was to be its first test to lend in Tanzania.
- ***Promoting access to finance for productive use solar*:** The lack of finance is a generally well-known constraint to MSMEs, especially in emerging markets. This intervention succeeded in targeting new sub-sectors within solar - the productive use space and smallholder farmers as the main customers.
- ***Customised loans***: The project successfully introduced and tested loans with repayment terms tailored to harvests to mirror the cash flows of farmers.
- ***Lending in local currency***: Ideally, SMEs wish to raise debt in their local currency. However, as start-ups with a limited track record and few bankable assets, they are not attractive to local financial institutions. Biashara lends in the local currency as well as hard currency, which makes its lending fairly unique for

local SMEs. Power Africa Tanzania (USAID) indicated that they were not aware of any lender having financed productive-use solar in Tanzanian Shillings (TZS) before.

- ***Resource mobilisation***: Existing and new funders disbursed USD 1.42 million in fresh funds to Biashara during the project period, while Simusolar raised USD 9.2 million debt and 4.8 million equity to Simusolar since project start

Project goals not or partially achieved:

- The ***administrative and operational burden*** on Biashara and Simusolar to implement the financing was much higher than expected. We underestimated the complexity of Tanzania's macro-economic environment, particularly cross-border capital flows and the development stage of the banking sector. We had issues remitting funds, because some funds that had to be tracked down or were temporarily withheld by the bank.
- ***Limited up-take of customized loans***: Farmers prefer having loans that are repaid regularly with a fixed instalment amount. Only about 10% of the farmers choose the customized repayment option. One reason could be that most farmers harvest continuously throughout the year collecting more than one harvest and their associated cash flows. Regular repayments are easier to handle. Certain items such as seeds have a higher priority after the harvest suggesting that while the post-harvest cash flow is higher deferred, household consumption and other farm investments possibly have a higher priority in the use of cash.
- Loan portfolio performance on SWPs in Tanzania was initially negative (but positive compared to loans for fishing lights offered by Simusolar). Some of the "growing pains" resulted from SWPs being a new technology and product, in-house development by Simusolar of the pay-as–you-go (PAYGo) technology, attempts to tinker with the PAYGo mechanism, misappropriation of repayments by sales agents, and a geographically diverse and dispersed market.
- With the experience gained in Tanzania, ***Simusolar set out to build up its busines in Uganda in 2019***. The COVID-19 pandemic significantly impacted the initial years and sales are picking up slowly. The loan portfolio performance on SWPs in Uganda has been positive, whereas the performance in Tanzania has improved.

Simusolar branch in Mwanza

4. LESSONS LEARNT

- The sales target of 1000 SWPs was achieved in December 2021, with 997 units sold, however this was two years later than originally planned. This is because the marketing and sale of SWPs proved to be a much more complex task than originally envisioned. The total cost of an SWP and ancillary items (water pipes, tanks) ranges from USD 700 to 5'000, with an average of USD 2'100. That is a sizable sum for local farmers, particularly smallholder farmers. Investing in SWP competes with other potential farming items such as livestock (also bought as an easily tradable savings item), seeds or household assets such as motorcycles, TV sets or used cars.

- Two years of the pandemic also weighed heavily on smallholder farmers (end-users), as well as impacted Simusolar's ability to drive marketing, implement sales and provide after sale services within the timelines of the project. Lockdowns, movement restrictions, curfews, and reduced access to other, complementary sources of income for farmers also played a role. Simusolar was also confronted with supply chain disruptions, delay in ports, logistics and customs, difficulty to execute on fundraising plans (both debt and equity), and staff affected by the COVID virus.

- Biashara na Fedha financed a total 150 SWPs. We initially made losses on financed units in Tanzania during the initial project phase. After-sale service quality issues and control boxes not working well affected repayments. Additionally, the uncertainties brought about by the pandemic restrained our lending appetite. These learnings helped identify and solve the technical glitches which prevented clients from paying on time and hence improved the loan instalment collection. It paved the way for improved implementation in Tanzania and the roll out in Uganda, where units financed have been profitable.

- Solar powered irrigation is a package of agricultural equipment (SWPs, drip pipes, water tanks, etc.) and advisory services. This is vastly more complex and sophisticated than selling a household item (solar lamp, solar home system or cookstove). Sales and marketing, as well as the technical skills that go with it, require a much longer engagement with the customer to complete the sale, install the equipment and coach the customer. This meant that Simusolar has to make a huge investment develop a platform of tools that links CRM, irrigation system design components, pricing components and monitoring components for technicians in the field. Simusolar continues to build up its presence in Tanzania and Uganda. Biashara intends to continue financing SWPs and Simusolar.

- Farmer-friendly financing or seasonal financing may see a larger uptake if channelled through farmer lending groups in cooperatives combined with discounts for a critical mass of interested farmers (e.g. bulk purchases by 5 to 10 farmers).

- Despite being neighbouring countries, Tanzania and Uganda have distinct local weather patterns, soil type and quality, different levels of general and financial literacy among its population and different penetration rates of financial services, use of mobile money and, ultimately, local customs and practices. For instance, Uganda has only fewer than half of the mobile money users compared to Tanzania. Both, Simusolar and Venture South Uganda, (VSU) Biashara's affiliate in Uganda, are adjusting their commercial approach to the context in Uganda to have a successful roll-out (e.g. push of group sales through cooperatives and partnering with agri-input sellers).

- Wealthier small commercial farmers have increasingly been attracted by the solar-powered pump technology. Simusolar initially tested more than a dozen models of surface pumps and started with just two submersible pumps. Currently, the product list has three types of surface pumps (output 1 to 2.2 m^3/h) and 12 models of submersible pumps (output 0.7 to 4.2 m3/h). Wealthier farmers have the means to dig the water hole and are very interested in higher flow rates.

- A critical success factor is that the SWPs distributors need to have a sufficiently large variety of pumps to address the diverse needs of farmers.

Client story

Marcel Iwaro is a pastor from the Pwani region. Financial institutions perceived Marcel as high risk leading to his inability to acquire a pump to enhance his farm's productivity. Additionally, the area he lives in has a high theft rate which increased his concerns to install a high value asset on his farm.

Marcel purchased the Kilimo Kwanza, a small capacity portable pump, which he was able to pay off in monthly instalments over 22 months. He received trainings on installing and disconnecting the pump, as well as appropriately storing it in his house where the risk of theft would be lower. Thanks to the pump, he saves two hours in his farm work, his income has increased by 40% and he was able to create two job opportunities on his farm.