



Feasibility Study for the Utilization of Solar Energy for Sugarcane Irrigation Pumping by Emerging Commercial Small Cane Growers in Eswatini

Output 4: Economic feasibility study.

Deliverable D4.2 - Brief on consumer financing mechanisms for the uptake of solar irrigation

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List of abbreviations

Eswatini Cane Growers Association	ECGA
Eswatini Sugar Association	ESA
Financial Institution	FI
Non-governmental organisation	NGO
Solar Powered Irrigation Systems	SPIS



1. Introduction

The increasing costs of electricity are negatively affecting cane growers in Eswatini, reducing their profit and affecting their overall wellbeing. In this context, Solar Powered Irrigation Systems (SPIS) appear as an opportunity for growers to adopt a solution that will reduce their operating costs, and, at the same time, will allow the growers to reduce their carbon emissions, and positively contribute to the country's efforts towards climate change mitigation.

The high upfront costs of switching from grid electricity to solar powered energy is one of the main barriers in the adoption of SPIS in Eswatini. The economic feasibility study conducted within the scope of this technical assistance for five farms in Eswatini estimated solar systems costs ranging from USD 55,600, for a 44 kW system for a small 47 ha farm, and a USD 2,720,000 for a 2.18 MW system, for a medium-to-large 400 ha farm.

In this context, providing access to finance to cane growers is a priority to ensure a successful transition to SPIS that considers end-user affordability. During the assessment of case studies of cane growers and growing communities in Eswatini, out of five assessed farmers without SPIS, all of them stated interest in acquiring these systems, with four of them stating that they would consider applying for a loan to finance the system. Local financial institutions have extensive experience in providing finance to cane growers, in the context of agriculture loans, which is an advantage to facilitate the provision of finance. Furthermore, discussions with financial institutions revealed that several cane growers have already approached them for finance for solar powered systems. However, the consulted financial institutions do not have yet a specific financial product for this technology.

The increasing interest in SPIS, and the high upfront costs make the development of tailored financial products for growers and growing communities interested in solar power and the collaboration with local financial institutions priority interventions to support for the market-based uptake of SPIS.

This report aims to present a series of financial mechanisms that can be adapted to the local context, in order to provide finance to cane growers interested in acquiring solar powered irrigation systems. Chapter two presents possible operational models to create a specialized loans for SPIS, while Chapter three presents financial instruments that have been successful in the past to provide finance in the context of agriculture. Chapter four presents additional risk mitigation and supporting mechanisms that complement financial products. Chapter 6 finalised the review by identifying success factors to promote SPIS and presenting the most suitable financing mechanisms to include within the context of Eswatini.

This study was based on a comprehensive desk research focusing on various innovative consumer financing mechanisms utilized in developing countries to support the financing of small and medium-scale enterprises (SMEs). These mechanisms aim to address unique financial gaps prevalent in developing countries. To assess the feasibility and applicability of these models in Eswatini, the mechanisms were discussed with local financial institutions to incorporate their insights and further adjust the document to the local context.

2. Operational model for the promotion of solar-powered irrigation systems (SPIS) among farmers

The section below proposes one operational model with two variations cases under which local Financial Institutions (FI) can offer finance to growers/communities for the acquisition of SPIS. This model focuses on building institutional capacities and expertise among FIs to evaluate the feasibility of granting solar loans, as well as strengthening partnerships between FIs and the existing technology providers already active in the country.

The two-hand business model

The two-hand business model is based on establishing a long-term partnership between the FIs and a committed energy service provider, or service providers. Under this model, the financial institutions will provide the finance (loan or credit) and the service provider the energy supply, knowledge, training, and maintenance.

This approach is more comfortable for FIs, particularly in the starting phases, since this type of structure allows the FI to stick to its core knowledge, lending, while the energy provider covers the supply chain and the technical aspects. In this model, a strong partnership and a common vision shared by the energy provider and the FI at the management and operational levels are crucial for ensuring the long-term success of the partnership.

International experience shows that over time, FIs tend to vertically integrate the energy business and to take over technical responsibilities, especially if the energy provider is not delivering proper services or product guarantees, which are crucial to loan-repayment.

This model can have two possible variations, with the FIs disbursing the loan directly to the grower/community, and the borrower paying the technology supplier (Case 1), or the FIs disbursing the funds directly to the technology provider (Case 2), consultations with local FIs highlighted the preference for Case 2.

2.1 Two hand business model - Case 1

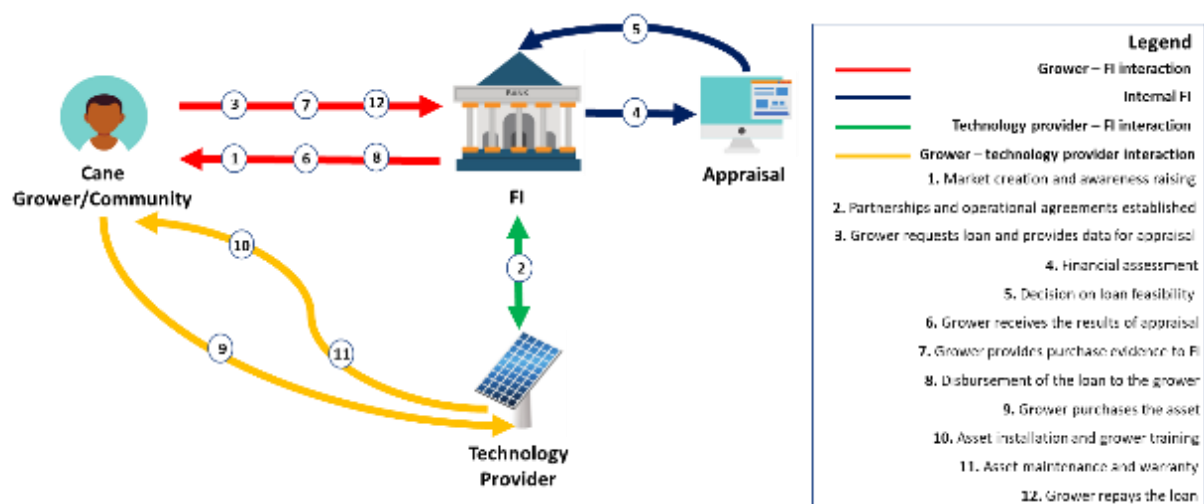


Figure 1. Two-hand business model - Case 1



Table 1. Detailed activities to operationalise case 1

Step	Responsible Party	Activities
1	Financial institution	<ul style="list-style-type: none"> Awareness raising and advertisement to attract potential borrowers Select authorized technology providers and establish partnerships and operational agreements Develop in-house capacity to conduct loan appraisal processes for granting finance for SPIS.
2		
3	Grower/growing community	<ul style="list-style-type: none"> Fill-in appraisal questionnaires Provide the necessary information for financial appraisal
4	Financial institution	<ul style="list-style-type: none"> Conduct the loan appraisal for SPIS to assess system costs and savings potential from cane growers/growing communities Determine the feasibility of granting the grower/community a loan for SPIS
5		
6	Grower/growing community	<ul style="list-style-type: none"> Receive results from loan appraisal and take them to an authorized technology provider Choose an asset based on the results of the loan appraisal and the proposal from the technology provider Provide evidence of agreement from the technology supplier to the financial institution (invoice, approval or proof from supplier)
7		
8	Financial institution	<ul style="list-style-type: none"> Disburse the loan amount to the grower
9	Grower/growing community	<ul style="list-style-type: none"> Purchase the asset from the technology provider
10	Authorized technology provider	<ul style="list-style-type: none"> Installation of the asset and training of the grower/growing community on its use Provide maintenance, replacement and warranty of the assets delivered to the grower
11		
12	Grower/growing community	<ul style="list-style-type: none"> Repayment of the loan to the FI according to the established conditions

2.2 Two hand business model - Case 2

The most relevant difference with case 1 is that in this case the loan amount is paid from the bank directly to the authorised solution provider, which will rely on a very close collaboration between the FI and the technology provider.

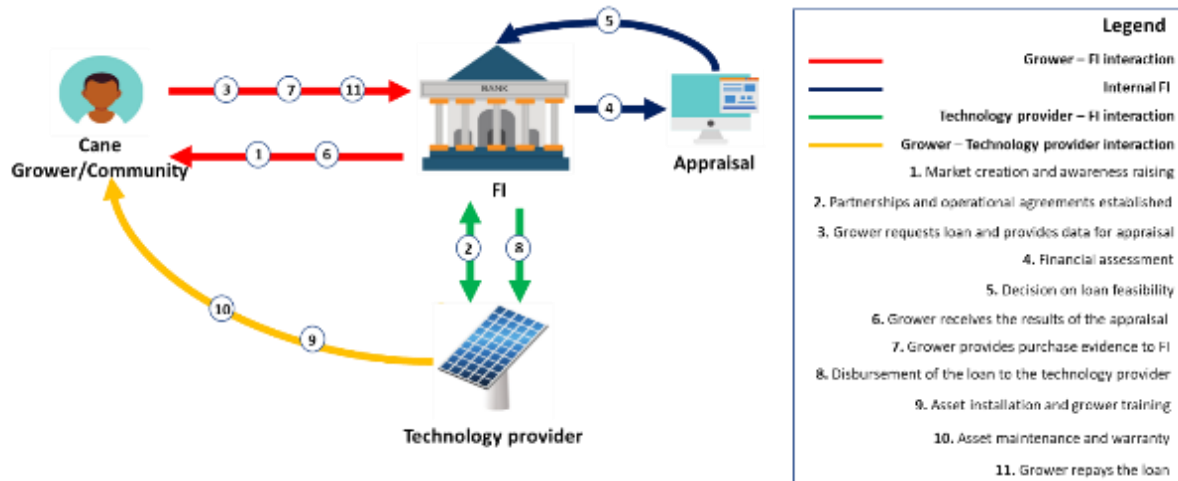


Figure 2. Two-hand business model - Case 2

Table 2. Detailed activities to operationalise case 2

Step	Responsible Party	Activities
1	Financial institution	<ul style="list-style-type: none"> Awareness raising and advertisement to attract potential borrowers Select authorized technology providers and establish partnerships and operational agreements
2		<ul style="list-style-type: none"> Develop in-house capacity to conduct loan appraisal processes for granting SPIS finance
3	Grower/growing community	<ul style="list-style-type: none"> Fill-in appraisal questionnaires Provide the necessary information for financial appraisal
4	Financial institution	<ul style="list-style-type: none"> Conduct the loan appraisal for SPIS to assess system costs and savings potential from cane growers/growing communities
5		<ul style="list-style-type: none"> Determine the feasibility of granting the borrower a solar loan
6	Grower/growing community	<ul style="list-style-type: none"> Receive results from loan appraisal and take them to an authorized technology provider
7		<ul style="list-style-type: none"> Choose an asset based on the results of the loan appraisal and the proposal from the technology provider Provide evidence of agreement from the supplier to FI (invoice, approval or proof from supplier)
8	Financial institution	<ul style="list-style-type: none"> Disburse the loan amount to the authorized technology provider
9	Authorized technology provider	<ul style="list-style-type: none"> Installation of the asset and training of the grower/growing community on its use
10		<ul style="list-style-type: none"> Provide maintenance, replacement and warranty of the assets delivered to the grower
11	Grower/growing community	<ul style="list-style-type: none"> Repayment of the loan to the FI according to the established conditions



A major challenge for financial institutions (FIs) in Eswatini is accurately assessing the feasibility of projects due to a lack of technical expertise in evaluating associated risks. This limits their ability to make informed lending decisions. The proposed operational model addresses this challenge by allowing FIs to concentrate on their core competencies while leveraging the technical capacity of technology providers through strategic partnerships. This collaboration ensures that the necessary technical assessments and risk evaluations are performed by experts, thereby mitigating the knowledge gap within the FIs.

Consultations with several FIs in Eswatini have yielded positive feedback on this model. The financial institutions appreciate that it addresses a critical gap, enabling them to better evaluate project feasibility and associated risks without needing to develop in-house technical expertise. Among the different cases examined, Case 2 stood out as particularly attractive to the FIs. This model simplifies the overall process by reducing the number of steps involved and minimizing the participation required from the growers.



3. Financial instruments for the promotion of solar powered irrigation systems among farmers

3.1 Directly financing growers/growing cooperatives

Where the main source or repayment from the growers will be the electricity savings from switching to an SPIS, the farm's conversion of working capital into cash flow through the production season, and, in the future once a net billing scheme has been implemented in the country, the additional savings associated to feeding-in excess electricity to the grid. A key characteristic of this type of finance is the need of the FI to understand the needs of the growers and their cashflows, in order to rely less on collateral.

3.1.1 Direct smallholder lending

Lending directly to growers or small growers' groups allows for the provision of a full range of financial services, success factors for the implementation of this mechanism are:

- Close collaboration with planter's groups and, the Eswatini Cane Growers Association (ECGA) and the Eswatini Sugar Association (ESA), in order to have a close contact with the cane growers and understand the structure of their operations and their revenue streams.
- The use of a credit feasibility study during the appraisal process that takes into account factors such as land holding and inputs to generate cash flow estimates, combined with previous client data and past experience.
- Group lending in the case of medium-sized farms to ensure collective responsibility.

3.1.2 Indirect lending through cooperatives

Under this model the FI lends indirectly to smallholders through an aggregator organisation, such grower-based organisations or cooperatives, under this model, the entire group is the borrower, and group members guarantee each other.

- In this case the aggregator organisation administers the loans and the individual group members are the borrowers.
- This approach reduces the FI costs of creditworthiness assessments and loan administration.
- The security of this approach can be enhanced through cash collateral requirements at the aggregator organisation level and direct integration of technology providers to reduce the amount of funding provided directly to the growers.
- This approach has the potential to reach a larger number of stakeholders. Furthermore, the aggregator organisations have the potential to become knowledge hubs for the provision of technical assistance for cane growers on basic operation and maintenance of the SPIS.

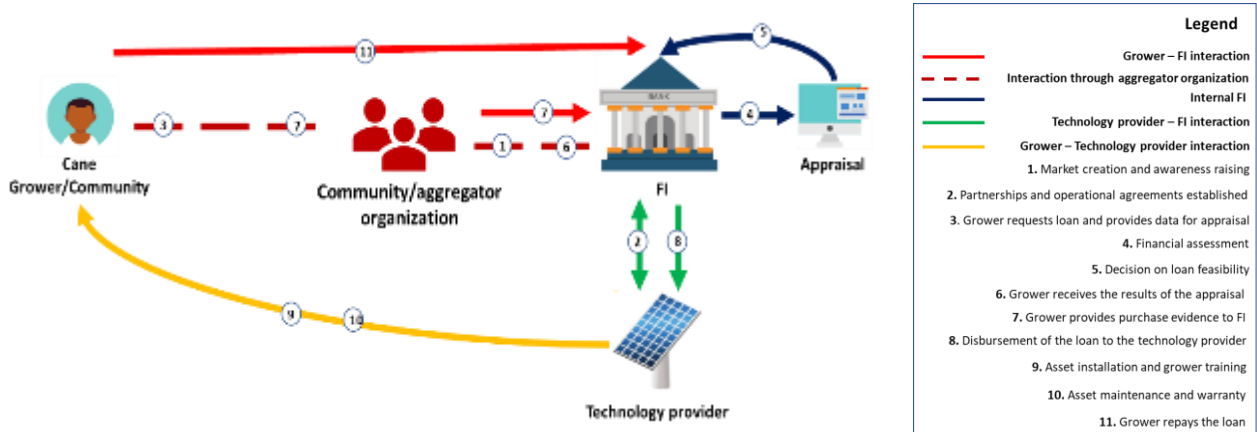


Figure 3: Indirect lending to smallholder growers

3.2 Asset financing

This type of financing mechanism is particularly relevant for the Eswatini’s case, with an asset, in this case the SPIS, as a secondary repayment source.

Some of the risks posed by this type of finance are the enforceability of collateral and the long-term local currency exposure, and an associated mismatch with the FI’s liabilities in the funding side. Even though multilateral institutions are interested in the provision of long-term funding to local FIs, these funds are often denominated in USD, creating a risk of mismatch with the local currency loan-terms.

3.2.1 Equipment finance

This financing of assets is based on loans with a pledge over the equipment. This type of financing relies on close collaboration between solution providers and the FI. Additional requirements are:

- A deep understanding of the equipment (SPIS) and its market, and close collaboration with technology providers.
- Understanding of the grower’s payment capacity
- Avoiding intermediaries
- Local networks
- A platform for effective repossession and remarketing of equipment for defaulting farms
- Knowledge of the collateral value of the SPIS.
- Efficient handling of cash payments in the absence of bank relationships with growers.
- Leveraging government subsidies

The option of granting loans for equipment finance over a leasing approach can be based on the preference of growers to own their equipment, accompanied by a standard down payment.

The risk of granting this type of loans can be further reduced via subsidies. An FI or a technology provider can pre-finance SPIS against a government subsidy payment that can act as a collateral. In this case the technology provider prepares a cost estimate, and the grower submits a subsidy application to a local subsidy implementation agency, and after approval, installation of the system and inspection from the subsidy implementation agency, the subsidy is released after a processing period (180-360 days)



3.2.2 Leasing

A lease is a contractual agreement between a party that owns an asset (the lessor) who allows another party (the lessee) use the asset for a pre-determined time in exchange for periodic payments, with the leasing focusing on the lessee's ability to generate cash flows to service the lease payment, and as the lessor owns the equipment, this can be easily repossessed

In some contexts, the leasing firms take additional collateral as security deposit or down payment. Jump starting rural leasing might require government and donor support.

Case studies of leasing for the agricultural sector show that the own capital is larger (around 40%), the FI retains full ownership of the asset during the life of the lease, and the asset is transferred to the borrower or sold to a third party after the lease terminates, additional success factors for this approach are:

- Longer payment periods
- Flexible lease payment schedules
- Recognising the leased asset as primary collateral
- Thorough evaluation of cash flows through documentation of income sources
- Insurance of the asset during the lifetime of the lease.

3.3 Value chain financing (VCF)

Value chain financing offers an alternative to relying on the creditworthiness of individual growers, rather than relying on business along the value chain, with, in some cases, the FI relying upon buyer contracts to help secure loans. Thus, providing the FI additional security from having a strong buyer along the value chain. The organisation of the value chain in Eswatini with cane growers across planter groups, the milling associations, the ECGA and the ESA have the potential to create additional trust among FIs, especially if there are off-take agreements for the growers from a trusted source, reducing the perceived default risk, and leveraging from the buyer's knowledge of the value chain of sugar cane.

Under this model, financing can come from the FI to the grower with the security of an agreement between the grower, buyer and FI. Some of the main benefits of this approach are:

- Knowledge from buyers and value chain actors of key risks and profitability factors for the growers
- Potential for bundling with other services, including training, which can lead to increased cash flows for growers and actors along the value chain.
- Incentive for buyers and actors across the value chain to monitor the growers

VCF can be provided through an FI in close collaboration with the buyer or key actor along the value chain, including arrangements to introduce growers to the FI, distribution and collection of funds or risk arrangements between the parties.

This financing method is already being implemented by some financial institutions, it allows FIs to replace traditional collateral requirements with the crops themselves, thereby reducing barriers to financing for small-scale growers.



A notable example in Eswatini is FinCorp, which has successfully applied this model in collaboration with sugar cane mills. In this arrangement, loan repayments are synchronized with the cash flow generated from the crops, ensuring a seamless and manageable repayment process. Specifically, the sugar cane mills pay FinCorp directly from the proceeds of the harvested sugar cane. This method aligns the timing of loan repayments with the crop's revenue cycle, significantly reducing the risk of default. FinCorp has reported that this product is the best performing in their portfolio, highlighting its effectiveness and reliability.

Given its proven success, other financial institutions are encouraged to adopt similar value chain financing (VCF) models to support the integration of SPIS systems.



4. Risk mitigation and supporting mechanisms

In addition to financial instruments, additional measures can be put in place, in order to de-risk the granting of loans for SPIS, de-risking the provision of finance is a priority intervention, as the technology is still new to the local market, relevant interventions that have been successful in reducing this risk and support the disbursement of finance are:

- **Grants:** Grants are non-repayable funds channelled to the growers. Developing a grant mechanism requires exploring partnerships with the Ministry of Agriculture, other public sector stakeholders and international development agencies or non-governmental organisations (NGOs) to mobilise funding towards establishing a program for the market-based uptake of SPIS, grants can be of two types:
 - **Capital:** Directly reducing part of the initial investment costs of SPIS
 - **Operational:** Ongoing amounts to cover part of the operational costs of the system, such as operation and maintenance.

Grants often target specific regions, marginalized communities, or women growers. Applying for grants involves for interested growers to submit proposals or applications. Successful grant recipients receive then funds to implement SPIS projects.

- **Collateral considerations:** SPIS installations require substantial upfront costs, resulting in longer repayment periods. Traditional collaterals like land might not always be feasible. Instead, alternative collaterals can be considered, including:
 - Traditional collateral: land or machinery
 - Alternative collateral:
 - Future Harvest: The expected yield from crops
 - Warehouse Receipts: Growers can pledge stored produce as collateral.
 - Livestock: Animals owned by the grower.
 - Collateral for Cooperatives: In cooperatives, SPIS ownership is collective. If one member defaults, the system can be transferred to another member, or the loan amount can be deducted from the dividends of the GROWER.
 - Using the SPIS as collateral. However, this alternative often depends on having a market for second life solar panels or solar components.
- **Insurance:** SPIS might face risks that compromise their ability to provide a continuous energy supply, such as theft, vandalism, damage or technical failure, which lead to unexpected expenses, loss of income and a reduced harvest income, harming the grower's ability to pay its loan. Combining a financial product with the provision of direct insurance covering the SPIS installation against weather-related damage, theft and vandalism can significantly reduce the default risks for the FI. A South African insurer, Santam, offers this type of solutions as part of their regular agriculture insurance cover. Figure 4 below shows a schematic of how such an insurance can work.

Solar systems are already being insured in Eswatini through local insurance companies. This experience has been limited to some larger solar plants that were implemented with financing, and the insurance is provided on request of financial institutions. The covers system damage due to fire and climate risks such as hail or flooding. The insurance is paid annually by

the end-user, and the system is ensured for the time is loan is taken. In case of total loss of the system, the system costs are reimbursed directly to the FI.

Further scaling-up this approach and establishing partnership agreements between financial institutions and insurance companies to ensure the uptake of loans for SPIS is accompanied by the uptake of insurance can reduce the risk perceived of granting finance for SIPS, while ensuring the long-term sustainability of the investment in solar energy.

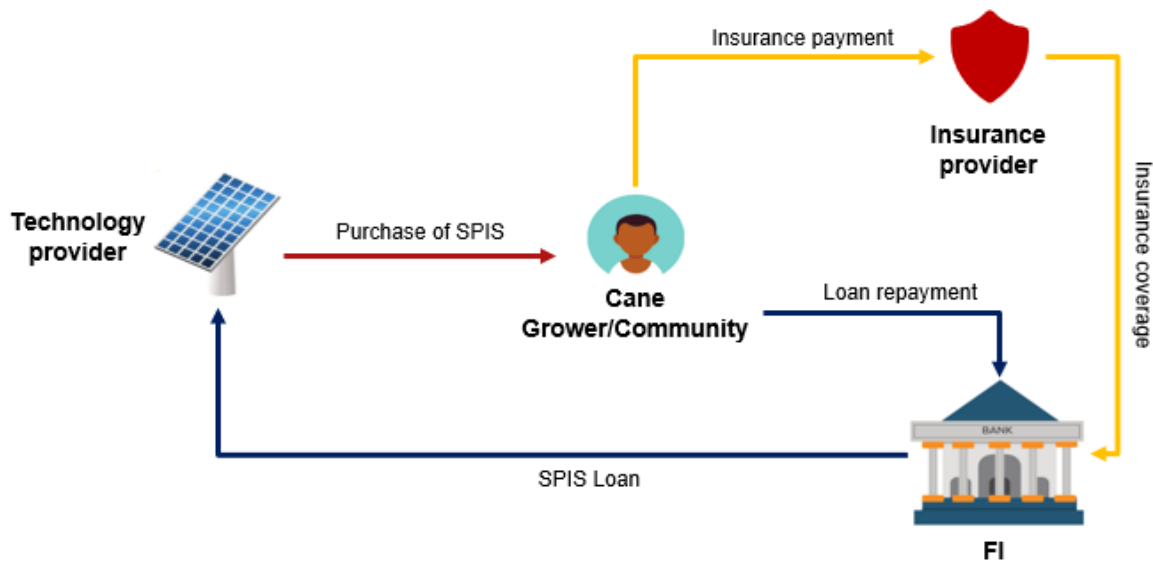


Figure 4. Insurance for SPIS finance

- **Repayment:** Besides a traditional repayment in regular instalments. Growers and FIs can benefit from cash-flow alignment aligned to the sugar cane crop cycle, where the income from the harvest is used to pay the loan, ensuring that repayment does not strain the finances of the growers during lean periods. Additionally, some financial institutions deduct loan instalments directly from the grower’s bank account, thus ensuring timely payments and reducing default risk



5. Conclusion

5.1 Success factors to grant SPIS finance

Key success factors to support the provision of finance to growers for the acquisition of SPIS are as follows:

- Cooperation with public sector and development cooperation institutions and agricultural development organisations for the mobilisation of funding (in the form of grants) to support the initial uptake of SPIS among cane growers.
- Repayment schemes aligned to the growers' cash-flows and crop cycles
- Building in-house knowledge among financial institutions. A capacity building programme for loan officers and other key staff should include:
 - Basic knowledge of SPIS, components, operation and benefits
 - Understanding quotations from technology providers and identifying low-risk and possibly successful investments
 - Assessing the risk of granting SPIS loans
 - Installers and products that fulfil quality standards.
- Partnerships with authorised technology providers

5.2 Review conclusions

- There is a growing interest among cane growers in SPIS and in the possibility of acquiring loans to finance these systems. Local financial institutions have already been approached by cane growers to request for financing. Furthermore, local financial institutions have extensive experience working with cane growers and other associations along the sugar value chain in the context of agriculture finance, which results in a promising opportunity to develop solutions tailored to the uptake of SPIS.
- The preferred options for promoting SPIS in Eswatini, as discussed with local financial institutions are, as follows:
 - As operational model, the two hand business model is the preferred option to grant finance to cane growers, with the loan disbursed directly to the technology providers. The establishment of partnerships between FIs and local technology providers would further facilitate this process.
 - Both financial institutions and insurance company stated that identifying groups of cane growers interested in solar through associations or cooperative has the potential to mobilise a larger funding and reduce the risk of granting finance or provide insurance. Furthermore, local financial institutions are aware of the potential of solar loans are interested in establishing a project pipeline for SPIS to mobilise funding from international development organisations. Grouping interested cane growers under cooperatives or organisations can also facilitate awareness raising and the provision of training and capacity building in relevant topics such as proper operation and maintenance of the systems.
 - Integrating Value Chain Financing for SPIS financing is an alternative that can be further explored with financial institutions, since financial institutions already work under this model for agricultural loans, with the milling associations., such an approach has the potential to reduce default risks.



- Exploring including the uptake of insurance as a requirement to grant loans for SPIS through the establishment of collaboration agreements between local financial institutions and insurance providers, as some local insurance companies offer this product.
- Lending to growers, especially those with the potential to become more productive, can significantly contribute to higher incomes and enable growers to transition from subsistence or semi-commercial levels to fully commercial operations. This transition can drive substantial rural economic and social growth. While lending to growers presents unique challenges, it can also be profitable for financial institutions, diversifying their overall lending portfolios and lowering funding costs through new deposits from growers.
- The rising cost of electricity is a significant burden on growers, increasing their operational costs. The long-term solution lies in switching to Solar-Powered Irrigation Systems (SPIS). However, the initial cost of switching is prohibitively high, necessitating innovative financing models to bridge this gap. Financial institutions should adopt these models to alleviate the financial burden of transitioning to SPIS systems.
- One of the most critical gaps identified is the lack of technical expertise related to SPIS systems. Addressing this gap is best achieved through partnerships with verified technology providers. Institutions such as the Eswatini Electricity Company (EEC), the Renewable Energy Association and the regulator (ESERA) could assist by providing a list of reliable suppliers.



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