A RENEWABLE ENERGY SOLUTION FOR SMALL TO LARGE BUSINESSES IN THE KINGDOM OF ESWATINI

Student name: Cusilakhe Manana

Student Number: 0511383A

A business venture proposal submitted to the Faculty of Commerce, Law University of the Witwatersrand, in partial fulfillment of the requirements for the degree of Master of Business Administration

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DECLARATION

I, Cusilakhe Manana, declare that this business venture proposal is my work except as indicated in the references and acknowledgments. It is submitted in partial fulfillment of the requirements for the degree of Master of Business Administration in the Graduate School of Business Administration, University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

CUSILAKHE MANANA

Signed at …Mbabane, Kingdom of Eswatini……

On the …21st.. day of …February… 2023..

DEDICATION

I would like to dedicate this report to my friends, extended family, and colleagues for all the continuous support and encouragement shown at different stages during this learning experience.

My family has been my strength and biggest motivation for me to reach my potential and I will be forever grateful for their endless love and unwavering support. To my sisters, Setsabile and Sifundzile Manana, thank you for being there for me during the good and tough times. To my mother, Dr. Tibekile Ainethah Manana, and my late father, Mr. Shesi Vusumuzi Manana, thank you for your patience with me and for guiding me all the way. Your support , encouraging words, and prayers pushed me towards achieving this and continue guiding me towards bigger heights.

Ngiyabonga bo Manana, Mcusi weNdlunkhulu, Mbuyisa. This is dedicated to you all.

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Finally, I would like to thank my friends in the Eswatini business and professional sphere who helped me formulate the idea and provided a sounding board for developing a solution that may be viable for Eswatini.

SUPPLEMENTARY INFORMATION

Supervisor:	Dr. Lumkile Mondi
Word count †:	16069
Supplementary files:	Survey Instrument
	Survey Data

† Including Executive Summary, References, etc.

List of Tables and Figures

EXECUTIVE SUMMARY

The Kingdom of Eswatini's electricity supply is not self-sufficient and relies on the import of electricity to meet its local demand. This has resulted in the country importing 73% of its electricity from foreign suppliers including South Africa, Mozambique, and the Southern African Power Pool (SAPP). This heavy reliance on imports means the country cannot guarantee future supply nor have full control of the tariffs charged to customers for electricity.

Solar photovoltaic (PV) technology installations have seen a steady increase worldwide due to improved efficiency in technology performance and a decrease in the cost of the technology. These advancements have resulted in solar technology becoming cheaper than traditional sources of energy available to consumers.

The business venture investigates the viability of using solar technology as a solution to the high electricity costs being paid by small to large businesses within Eswatini. The venture aims to install, own, operate, and maintain solar PV plants at the customer's property and sell the generated power to the customer. The venture does not seek to replace the utility supply but aims to provide an alternative cheaper solution as an input into operations.

The business venture proposal targeted small to large businesses from varying industries across the country as respondents for the study. In the study, the market perception towards solar technology as well as consumer behavior analyzed to assist in formulating a business model for the venture which would ensure uptake of the value offering. Furthermore, the business venture investigated the viability of the project by evaluating performance parameters which included the levelized cost of energy (LCOE) of the solar plants, cash flows, Internal Rate of Return (IRR), and the Net Present Value (NPV).

The investigation followed a quantitative research approach to gather and analyze findings from identified respondents within the targeted customer segment. Surveys were used to gather data and thereafter the data was analyzed using SPSS to formulate findings. These findings informed the consumer demographics, market perception, and consumer behavior analysis.

The results from the findings informed the strategic approach to be followed by the business venture to effectively meet the needs of the customer and ensure profitability for the investors. The cost-focus strategy aimed at providing the cheapest electricity to business customers was chosen as a competitive strategy and analyzed. The report and its findings were aimed at providing potential investors with clear and required information required in their decision-making process.

Contents

1. INTRODUCTION

1.1. Introducing Renewable Energy Solutions

Electricity in the Kingdom of Eswatini is transmitted and distributed by a state-owned parastatal called Eswatini Electricity Company (EEC). EEC is a vertically integrated company tasked with the generation, transmission, and distribution of electricity to various customers across the country (EEC, 2021). Businesses in Eswatini use electrical energy sourced from the local electricity company, EEC, as an input into their operations. Commercial and small-scale industrial customers currently make up 8.5% of the number of electrical energy users supplied by the local utility but are responsible for 67% of the sales revenue (EEC, 2021). In this business venture research proposal, the venture is looking to introduce onsite solar panels as a new business opportunity to exploit the growing and large energy-consuming business sector in Eswatini and the growing need for organizations to be more sustainable through the introduction of variable renewable energy (VRE).

1.2. Nature of the Project and Detailed Description

The project seeks to install photovoltaic cells and inverters on the customer's premises and generate revenue by selling the energy produced. The VRE solution to be implemented on-site is based on solar energy using photovoltaic cells (PVC). The roof of buildings can generate electrical energy to meet demand and also supply back into the power network whilst also boosting energy efficiency through the installation of photovoltaic cells (Grande-Acosta & Islas-Samperio, 2020). The PVC converts energy from sunlight into electrical energy through an inverter. The number of photovoltaic cells and the size of inverters to be installed are dependent on the load requirements of the customers. The energy provided by the installation is used to meet all onsite electrical requirements.

The customer may also choose to have an energy storage system installed to harvest energy in the event of excess energy generation or to assist in

counteracting the intermittent nature of solar energy (Hoppmann et al., 2014). This energy is harvested for use at a later stage based on the needs of the consumer. The energy storage system is made up of a series of rechargeable lithium batteries. These are mostly used for customers who prefer to have a completely off-grid electricity supply as opposed to having the national grid as a backup. The battery sizes and quantities vary according to the load requirements and the off-grid time required. Battery storage however comes at an extra cost to the solar PV installation and affects the economic viability and the ability to break even for the project. The venture seeks to employ a least-cost option to assist customers with high electricity tariffs.

The project seeks to install and maintain a hybrid energy solution on the customer's property which seeks to complement the already existing utility power supply by providing energy during the day at a pre-negotiated price per unit. The installation will be fully owned by the venture. This venture aims to compete by providing a bigger value proposition to the consumer by giving them the benefit of renewable energy without having to own and operate it. The customer is billed on the metered energy consumption from the installation. The business venture seeks to hold a competitive advantage over the electrical utility through the provision of cheaper electricity which is more reliable and is friendlier on the environment.

Although the project targets primarily the supply of on-site customers it can also potentially be used to supply the electricity grid in the event of excess generation. Photovoltaic cell solar generation infrastructure owners are not just consumers of energy on site but could become sellers of energy to the grid provided the required policy frameworks are in place (Safaei et al., 2013). These owners of solar technology are now more known as prosumers as they both produce and consume electrical energy which they generate from their own sites (Gržanić et al., 2022). Prosumers will generally use some of the generated electricity for their operations and potentially export the excess power to the electricity grid for a monetary return.

1.3. The Scope and Operational Structure

The scope of the business venture involves installing solar energy solutions at commercial and small-scale industrial customer premises. The installations will be managed, maintained, and operated by the business venture to ensure the energy security supply. The business venture will employ installers with technical knowledge who will also work on the periodic servicing of all equipment. The installation team will also work on any faults and reactive maintenance which may need to be carried out on the equipment.

The scope and operation of the business are as follows:

For new installations:

- Customer approaches the business or is approached by the business to provide an installation
- A site visit is conducted to evaluate the customer's property
- A shading analysis is conducted to check for shading from nearby trees or objects
- Customer load requirements and load profiles are analyzed
- Projected performance analysis of the system and system requirements is determined
- Negotiated energy supply contract period and tariff
- Installation of the required equipment is carried out
- An electrical energy meter is installed
- Periodic maintenance and solar panel installation are carried out

For faulty equipment:

- Customer notifies business of fault
- Technical team is dispatched to the site
- Faulty equipment replaced or maintained
- Fault report with root cause prepared

1.4. Context of the study

1.4.1. The industry

The electrical supply industry and demand have been constantly growing over the years for both domestic and commercial customers as electricity has been a major catalyst for economic growth (National Research Council, 1986). This venture seeks to take advantage of this growth by providing a service to customers which will enable and support growth in the economy of Eswatini.

The Kingdom of Eswatini is a landlocked and developing country situated between South Africa and Mozambique. The country's economy is mainly driven by the agricultural sector through sugar production with other sectors playing a supporting role (Dlamini & Bekker, 2020). EEC is the sole electricity utility and has been tasked with supplying electrical energy to meet the needs of the country and has achieved this through the import of power, independent power producers (IPPs), and self-generation. Figure 1 shows the current energy source mix within Eswatini (EEC, 2021).

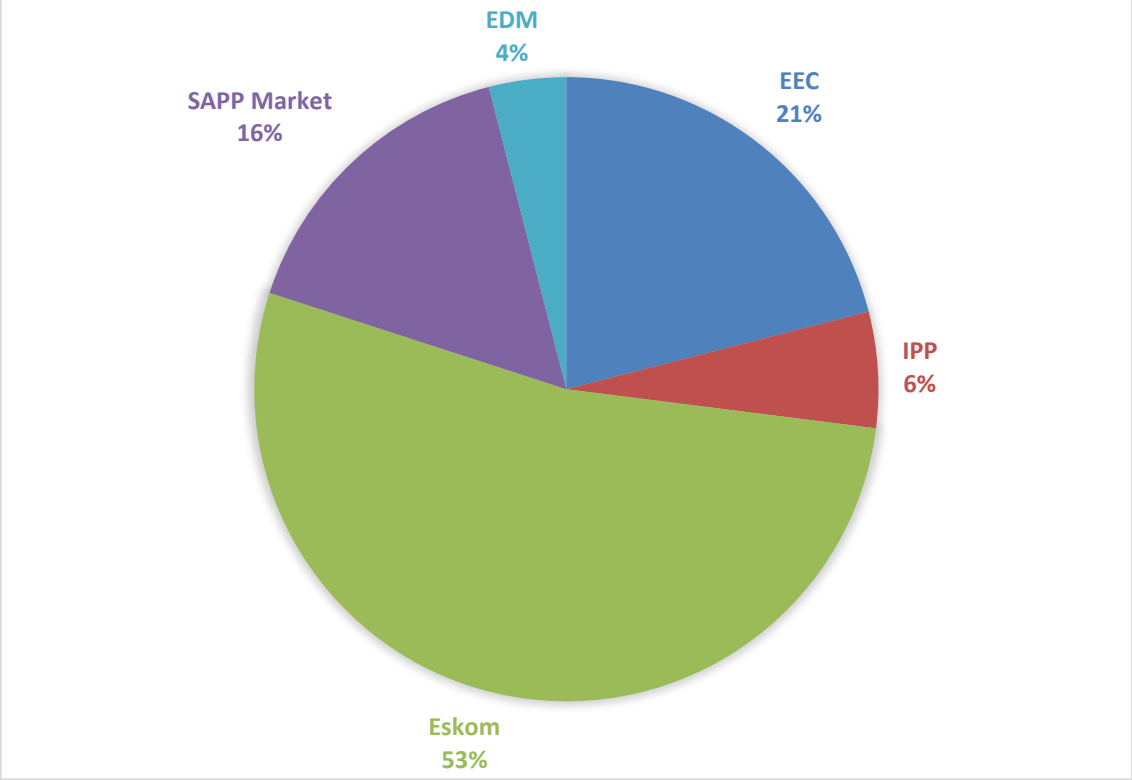


Figure 1: Eswatini Energy Sources (EEC, 2021)

The customer demand is made up of domestic, commercial, and industrial customers in the country. About 53% of the electrical energy consumed in the country is sourced from South Africa's Eskom which is a vertically integrated electric utility that is grid-connected to Eswatini. A further 16% is sourced from the Southern African Power Pool (SAPP). The SAPP comprises utility companies from 12 Southern African countries that trade electricity with each other to assist in meeting national demand and reducing electricity costs (Bowen et al., 1999). Electricidade de Mozambique (EDM) is another electrical utility that provides 4% of the energy supply to Eswatini. Within the Eswatini borders, there are a few Independent Power Producers (IPPs) who are net exporters of power and assist the EEC to meet her demands. These IPPs include Ubombo Sugar Limited (Bio-mass) and Wundersight Plant (Solar). Only a small portion (21%) of the electricity supply comes from EEC's internal generation which includes hydro and solar plants (EEC, 2021).

Eswatini is currently not self-sufficient and therefore relies on its imports from other sources. This translates to issues that are currently affecting South African consumers being transferred to and being experienced by customers in Eswatini. The electricity pricing for Eswatini has become heavily reliant on the prices set by the major suppliers outside of the country. Tariff applications by Eskom play a significant role in the tariff award in Eswatini as Eskom supplies a major portion of Eswatini's energy (ESERA, 2022).

The supply of power from Eskom is predominantly from coal-fired power stations with renewable sources only contributing to a small fraction of the energy output. Figure 2 highlights the different outputs of energy supply in South Africa (IEA, 2022).

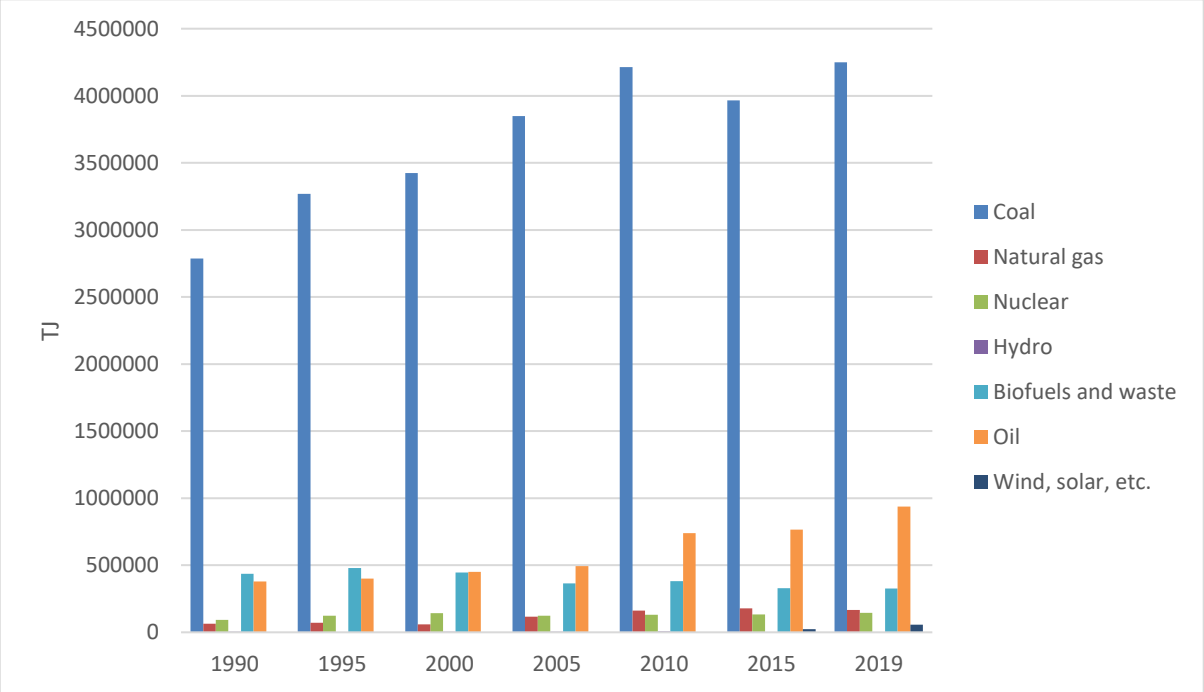


Figure 2: Total Energy Supply by source in South Africa (IEA, 2022)

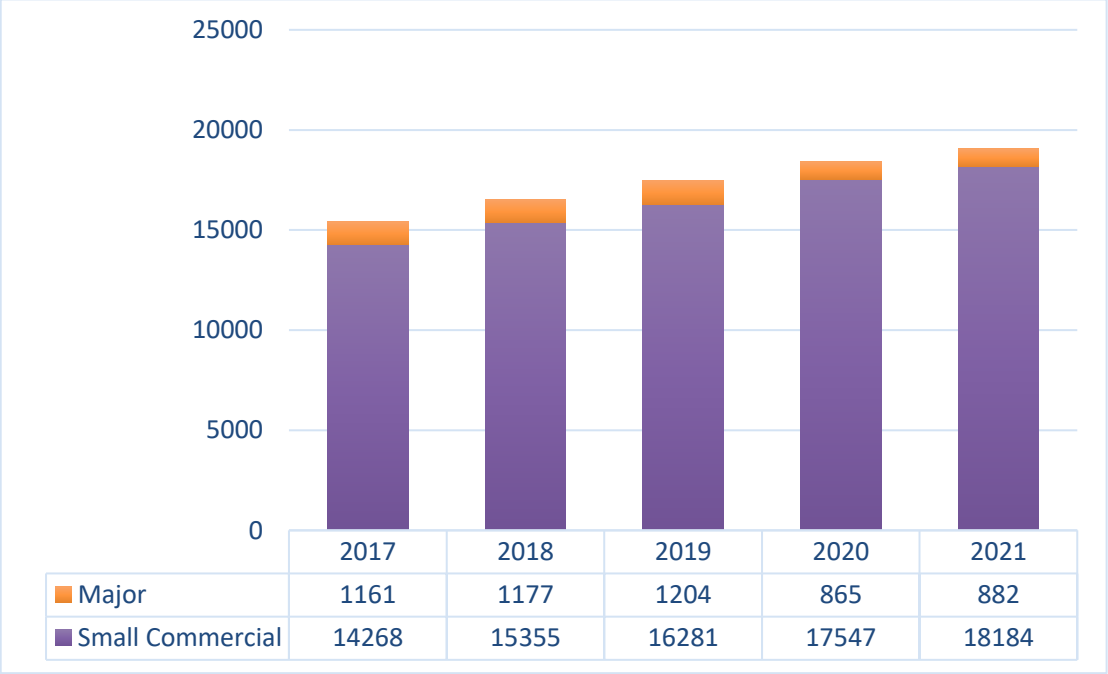
The figure above shows that South Africa is still heavily reliant on non-renewable sources of energy for its supply. The supply and its baseload are met by the coal-fired generation plants with biofuels and oil being the next best contributors. The

Energy supply figure further shows a lack of significant growth in the supply of energy from renewable sources like solar and hydro (IEA, 2022).

The local utility offsets the high cost of electricity through its local generation which contributes to 21% of the local demand as shown in figure 1 above. The local generation is used for load peaking to minimize the high maximum demand costs. This is achieved through the use of 4 hydropower power stations (60 MW) as well as a newly commissioned 10 MW solar plant (EEC, 2021).

1.4.2. The Market

Eswatini currently has over 227 000 active customers which can be classified as domestic, commercial as well as industrial customers. Over 19 000 of these customers are within the small to major commercial sectors as well as the industrial sector and are involved in various activities which include mining, agriculture, commerce, retail as well as hospitality (EEC, 2021). The number of customers within these sectors is steadily increasing and the venture sees that the market is large enough to exploit with the proposed service whilst also expecting future growth.



	2017	2018	2019	2020	2021
Major	1161	1177	1204	865	882
Small Commercial	14268	15355	16281	17547	18184

Figure 3: EEC small commercial and Major customer growth (EEC, 2021)

Figure 3 shows the growth trend within the utility's commercial and industrial (major) customers over five years (EEC, 2021). The number of small commercial electricity consumers far exceeds that of the major consumers. Figure 3 also shows that there has been steady growth for both consumer groups combined over the period shown but the growth has started showing signs of slowing down in recent years. The slowed growth is evident in the reduced number of major customers in the years 2020 and 2021 whilst the small commercial numbers continue to grow.

The growth has been slowed by the negative economic impact of the COVID-19 pandemic, especially on major and commercial entities. However, there remains a potential for the customer numbers to increase, therefore increasing the electricity market in the future. Although the venture may not be practically able to supply and convert all the 19000 potential customers into effective business, however, it can put the effort into marketing the benefits of adopting solar technology to businesses to ensure that it is a success.

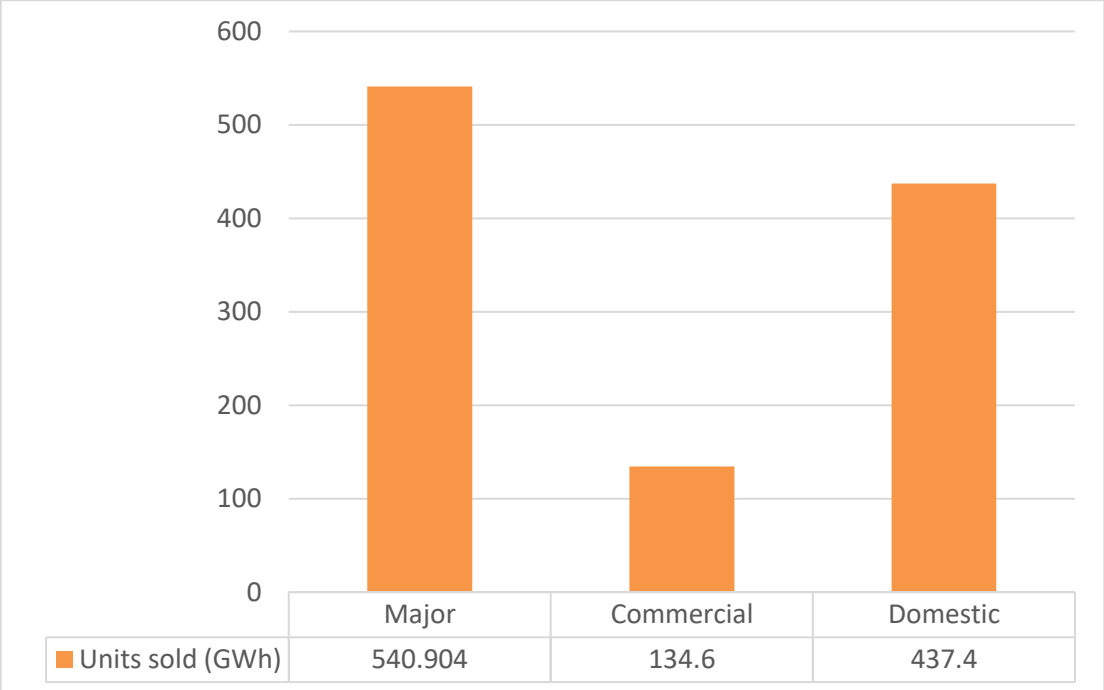


Figure 4: Eswatini sales units by customer category (EEC, 2021)

Figure 4 shows the different energy consumption values from the different customer classes which make up over 227 000 active EEC customers. As previously stated, major customers make up the smallest customer numbers yet consume half of the country's energy consumption in a year. Furthermore, commercial and major customers make up less than 10% of the energy users in the country yet are responsible for the consumption of over 60% of the country's energy demand (EEC, 2021). This means that a significant portion of the revenue is from a small number of customers who will be targeted by the venture as potential consumers.

1.4.3. The Opportunity

Commercial businesses require electrical energy as one of the main inputs into the process. The recent challenges being faced by energy suppliers in the region in ensuring reliability in the supply of electricity have created an opportunity for alternate forms of supply. This is also the case for Eswatini customers as a large portion of their electricity is sourced from Eskom. The increase in the cost of electricity over the years due to tariff increases has meant that businesses are now looking into other forms of supply which may potentially cost less.

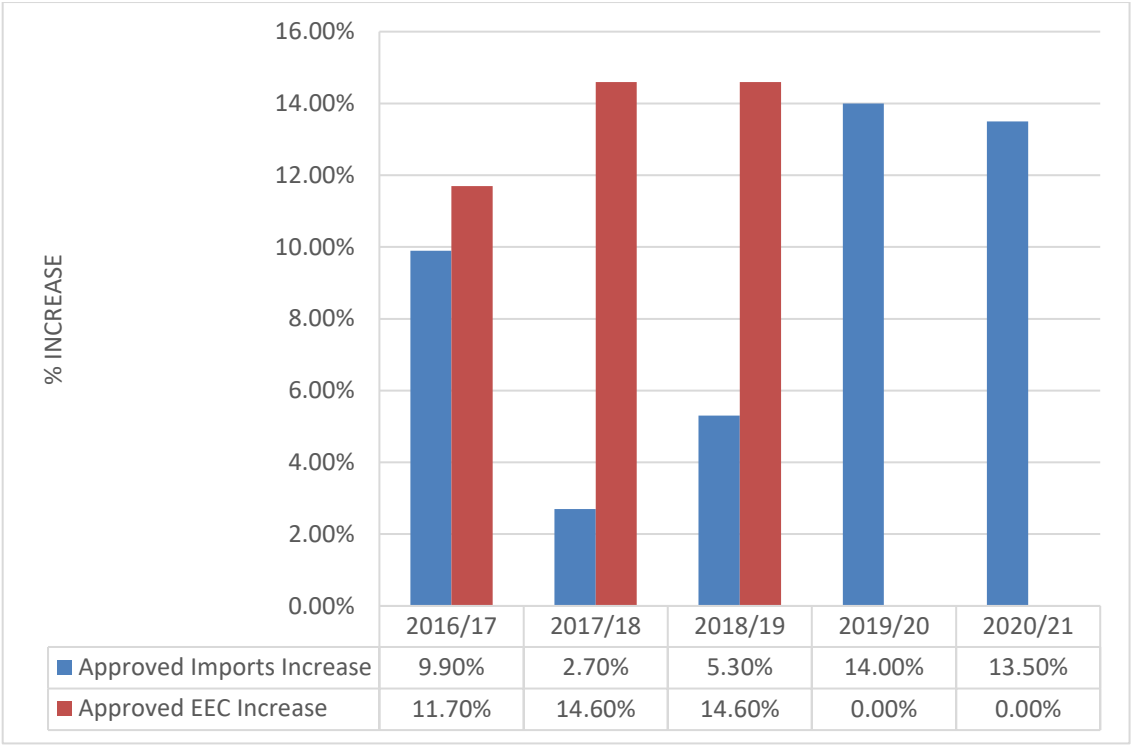


Figure 5: Import Market Price Increase vs EEC Approved Increase (EEC, 2021)

Figure 5 above shows the tariff increases which have been passed on to the consumer in recent years (EEC, 2021). The import tariffs have been increasing over the years with the EEC tariff being frozen over the last two years besides a significant tariff application. The freeze was implemented by the Government of Eswatini as a response to the economic effects of the COVID-19 pandemic. The figure is an indication that the price of energy is set to continue increasing in Eswatini besides the recent freeze as the utility must remain a going concern and should be passing on the increased costs to the customer. The EEC has recently applied for an average 21.31% tariff increase with the energy regulator for each of the 2023/2024 and 2024/2025 financial years (ESERA, 2022). These proposed tariff increases will result in increased electricity input costs for organizations and have been met with negative sentiments from the business community. These impending tariff increases are further compounded by the National Energy Regulator of South Africa (NERSA) awarding ESKOM with an 18.65% tariff

increase in the 2023/24 financial year and a further 12.74% increase in the following financial year (NERSA, 2023).

Renewable energy solutions through PV technology provide an opportunity for the venture as a solution to the increased tariff costs. Improvements in manufacturing processes coupled with improvements in the technological features of the PVCs have resulted in a steady reduction in their cost (Elia et al., 2021). Figure 6 shows the trend in cost reduction for solar PVC when compared to wind technology over 30 years. The continued reduction in the costs of these units increases the opportunity for the venture.

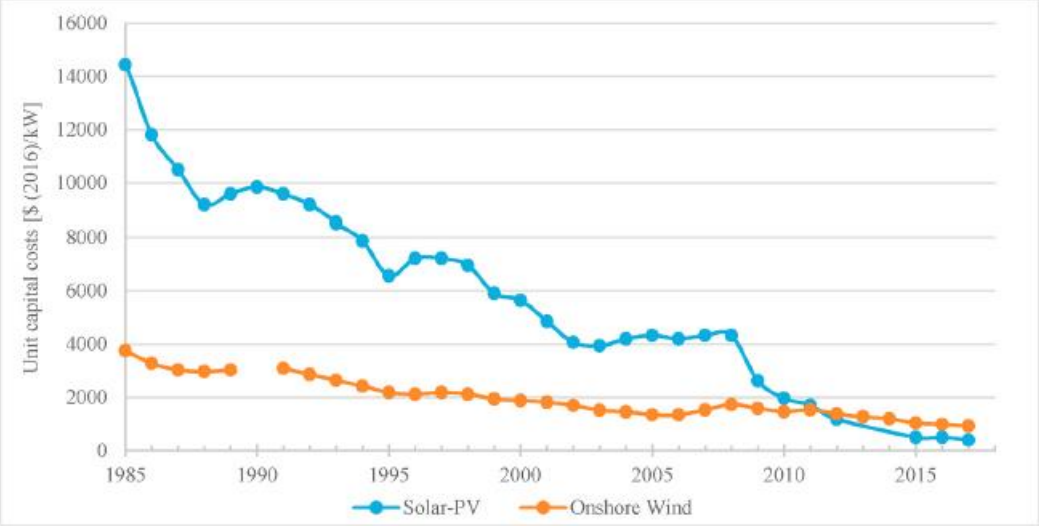


Figure 6: Annual cost for solar PVC and onshore wind turbines (Elia et al., 2021)

Customers and commercial businesses are also beginning to investigate using sustainable products and services which do not negatively affect the environment to make a positive carbon footprint. However, to do this, businesses need to invest the capital to build solar PV plants as well as adequately equip themselves to maintain this asset and ensure it operates optimally for its lifetime.

The business venture seeks to provide a potential customer the opportunity to address all the above concerns by providing a solution that is cost friendly, reliable, and environmentally sustainable through providing and maintaining solar technology electricity at a discounted rate when compared to the utility.

1.5. Aim and Objectives of the Study

The start-up venture believes that there is adequate opportunity in Eswatini for the supply and installation of solar panels and market for it to be successful. It would like therefore to further investigate the financial viability of the project as well as investigate the following two aspects when introducing solar power energy provision to commercial customers in the Eswatini market:

1.5.1. Market Perception

The Eswatini economy continues to rely on electrical energy predominantly sourced from South Africa which has increased costs and reliability concerns whilst there is new technology available in the market which is economically viable and decreases the reliance on electricity suppliers. This study aims to investigate the market perception with regards to the support from commercial customers to the new technologies that take away from the traditional supply of electricity and how the market may receive this proposed service offering. This perception will inform the uptake of the proposed business venture as well as the viability of the venture solution.

1.5.2. Consumer Behaviour

The study investigates how the introduction and availability of the solar panel solution for commercial customers can shape the adoption of the solution by other potential customers. The venture would like to gain an understanding of consumer behavior and the current pain points commercial consumers have with regards to electrical energy provision within the market. This analysis can assist in identifying the potential gap in the market to best position the business venture. The business venture should be positioned to effectively fill any shortcomings in the electricity supply industry as well as improve the customer value proposition. This analysis can inform the business model the venture will follow.

2 LITERATURE REVIEW

2.1. Data Substantiating Existence and Potential Size of the Market

Energy consumption has become one of the major needs for a society to perform optimally and to ensure economic growth (Bennett, 2014). This is the case for many African countries and in particular the Kingdom of Eswatini. There has been a steady growth in energy consumption over the years due to rising demands with non-renewable sources still providing a large share of the world's energy requirements (Ozcan & Ozturk, 2019).

The Kingdom of Eswatini currently imports 80% of its national electricity demand from ESKOM, local Independent Power Producers (IPPs), the Day Ahead Market (DAM), and the SAPP Markets (EEC, 2021). One of the main IPPs in the country is Ubombo Sugar Limited (USL) which supplies energy to the utility by co-generation using biomass from its operations.

Modern variable renewable energy (VRE) sources account for a small fraction of the total energy consumption in the world with the percentage of usage expected to increase as countries reduce their high reliance on fossil-based energy sources (Ozcan & Ozturk, 2019).

World events and developments have brought a greater and accelerated need for countries to transition from the use of non-renewable energy generation to renewable alternatives. This is due to growing concerns about the high emission of greenhouse gases from non-renewable sources which lead to environmental degradation (Kartal, 2022). Renewable energy is naturally produced and does not contribute to the emission of gases which has resulted in a greater demand for them.

Countries at COP26, the UN annual climate change conference, committed to accelerating the phasing out of coal use as well as putting an end to the financing of fossil fuel projects (Mountford et al., 2021). These commitments were made to achieve a reduction in emissions that contribute to global warming. The

commitments, therefore, mean that Eswatini has to look at renewable energy to be self-sufficient and meet its growing needs as new fossil fuel-based projects will not receive funding. The COP26 outcomes also highlight a plan to support and finance developing countries towards meeting their climate change objectives. The Kingdom of Eswatini has committed to increasing its share of renewable energy in the electricity mix to 50% by the year 2030 through the introduction of various technologies as its contribution towards the world meeting the objectives of the Paris Agreement (UNDP, 2021).

In 2022, COP27 was held in Egypt where countries reiterated their pledges and commitments towards limiting global warming to well below 2°C (COP27, 2022). COP27 agreed to continue implementing the COP26 adaptation plan whilst ensuring that there is adequate climate financing to ensure countries make progress towards achieving their goals. These adaptation plans will be met through the effective collaboration of governments, the private sector as well civil society to ensure innovations and practical solutions are implemented to help in alleviating the impacts of climate change.

Solar technology solutions are seen as one of the many solutions available for meeting the energy demands of the world. These solutions have proven to be good renewable energy alternatives as they have been implemented across the world. Solar technology has the potential to meet the energy demands of the world but remains underutilized when compared to other alternatives (Kabir et al., 2018). Eswatini requires additional energy generation to meet its economic and energy needs and solar is a viable option.

The technology surrounding solar technology and its operating dynamics are constantly changing and improving due to further research and development in the sector. The results of these improvements will potentially disrupt the electricity supply industry in the long term. Whilst this is happening, the business venture aims to acquaint itself with the dynamics and challenges which may be faced during operation to best understand the market.

2.2. The Unmet Need

Eswatini currently imports 73% of its electricity from South Africa, Mozambique, and the SAPP to meet its local demand. The other 27% is generated by the country through hydro-generation, newly built solar plants, and local IPPs. The overreliance of the country on energy from other countries highlights a lack of capacity towards meeting the energy needs for current and future needs. The local capacity shortage serves as a deterrent for future investors in the country. To assist in meeting the need for reliable and secure energy in the country, there needs to be an increase in generating infrastructure. The introduction of solar generation can serve as the best alternative for meeting this need as Eswatini has viable global irradiation numbers across the whole country (Mashwama, 2020).

Solar energy through embedded generation aims to meet the self-sufficiency needs of the customer on their site. It is particularly attractive for a commercial business to install embedded generation systems for several reasons. These include ensuring the security of supply for its operations through diversification, ownership of generation capacity, peak load shaving, environmental change benefits, potential reduction of electricity costs as well as mitigating bottlenecks within the electricity supply sector (Reinecke et al., 2013).

Based on the above, it is evident that customers do not only require electrical energy as an input into their processes but need to assess other factors when considering their supply. Historically customers in Eswatini have been forced to utilize the services of the utility but with the rising installation and tariff costs there is a need to look at other sustainable solutions.

2.3. Target Market

The Electricity Act of 2007 of Swaziland was developed as means of stimulating the deployment of embedded generation facilities in the country. The Act creates the framework for potential producers of power to produce power up to and including installations of 1MW in size. The Eswatini Energy Regulatory Authority (ESERA) is currently working on a methodology of licensing embedded

generation installations above 1MW to enable connection to the grid and wheeling of power. Currently, solar-embedded generators use their energy for their own need without feeding back into the utility grid.

Users of energy which generally require installed capacity of up to 1MW include commercial and small industrial applications. These users can install embedded generation without the need for licensing from ESERA. Commercial and small industrial customers also require energy that is reliable and sustainable without the bottleneck conditions of the utility. The high tariff rates usually charged to commercial customers during the high seasons (the months of June, July, and August) also prompt customers to look for alternative solutions to their power supply.

Ideal customers to be targeted also include those in industrial areas which are populated by multiple businesses to potentially enable the sharing of embedded generation supply to more than one customer. This could be achieved by installing a larger solar unit that could meet the demands of multiple customers. Other ideal customers would be those currently on the time of use (TOU) tariff with the electricity supply as the venture could lure them away with a more attractive and fixed tariff. As such, the venture seeks to provide a cost-leader strategy business aimed at increasing revenue to increase market share and improve profitability.

The venture also seeks to target small-scale farming and irrigation applications. These applications face high installation costs to install electrical reticulation from the utility as well as higher energy demand and tariff costs. The installations tend to have reliability issues which impact productivity. The venture seeks to provide a solution that will reduce energy costs for the user in the long run whilst also providing improved reliability and sustainability. The venture aims to onboard a customer a month at the initiation with further growth seen as the venture matures.

2.4. Concept Acceptance

The introduction of new technology and innovation has brought about growth in embedded generation both internationally and in the Kingdom of Eswatini (Dlamini & Bekker, 2020). The solar-embedded generation supply business venture seeks to take advantage of the demand and disruption that this technological disruption has brought into the market.

One of the outputs of the study is to determine the acceptance of the business venture together with the proposed business model. The business venture might not have a first-mover advantage in the renewable energy space but aims to create a solution that is unique to the local Eswatini climate whilst also taking advantage of prior experience in the electricity provision space.

A Technology Acceptance Model (TAM) similar to the one conducted by Yang et al.(2021) has been adopted for the study. The TAM aims to assist in investigating the preferences and attitudes which customers have towards a type of technology and the desire that the customers may have towards adopting the technology. The model identifies the user's intention to adopt new technology as a dependent variable versus the user's perceived usefulness and perceived ease of use of the technology (Yang et al., 2021).

The model aims to investigate the following factors with regards to the attitude of acceptance of the use of renewable technology:

- Perceived Usefulness
- Perceived ease of use
- Perceived affordability
- Environmental awareness

Perceived ease of use highlights the extent to which a user sees how they would use the new technology without effort (Yang et al., 2021). Factors and opinions which may potentially affect the user's perception of ease of use may include installation of technology, maintenance, usage, and the eventual recycling of the technology (Bandara & Amarasena, 2018).

This research project aims to investigate how the customer preferences and variables listed above may potentially affect the consumer's behavior towards the supply of embedded generation energy provision solutions.

2.5. Understanding Purchase Patterns and Consumer Behaviour

In the investigation, the venture seeks to understand the purchasing patterns and factors which drive consumer technology towards the renewable energy solution. Consumer buying behavior is based on a customer's perceived value towards a service or product (Sangroya & Nayak, 2017).

The perceived value for the customer is made up of functional, social, emotional, and conditional value elements. Functional value considers the maximum value that a customer can receive at the minimum cost due to its physical performance. Social value for the customer looks at how the individual or organization will be perceived by society after the purchase of the product. The emotional value considers the consumer's emotions and feelings which they may go through whilst buying a renewable energy product. The conditional value element considers the value that a consumer may derive from its structural and situational environments which may include incentives and subsidies for using renewable energy.

Based on the analysis of consumer behavior, the study seeks to understand how providing energy to consumers from a renewable source will influence their buying behavior. The factors analyzed have a major effect on the market perception of the solution which is key to the success of the business venture.

To increase the chances of success of the venture and to achieve the desired sales volumes, behavioral economics needs to be used. Behavioral economics is used to nudge the consumers as an attraction tool whilst still leaving the consumer with the freedom to choose (Momsen & Stoerk, 2014). The venture aims to use behavioral economics to nudge consumers to make certain decisions about buying this service. Several nudges need to be employed to affect the

consumer's choice on whether to continue using conventional energy or make the switch to renewable energy.

Two propositions were then formulated based on the above discussion to form the basis and purpose of this study.

2.6. Problem Statement

Commercial and industrial consumers of electricity are currently facing several challenges, which include the following among others; a growing gap between electricity demand and supply resulting in load-shedding, increasing electricity costs due to increased tariff awards, security of electricity supply, and growing concern amongst customers on environmental sustainability. Therefore, this investigation intends to determine the existence and size of the Eswatini market for a small-scale embedded generation service provider, providing renewable energy as an input into the operations of commercial and small-scale industrial consumers as opposed to using utility-provided electricity. The study will determine the demand and uptake for the business venture as well as price the business model to ensure its viability.

2.7. Business Model

2.7.1. Start-up Approach

The embedded generation renewable energy solution aims to bridge the gap and unmet needs of potential consumers. The venture seeks to use the minimum viable product approach as a start. This approach will avoid any lengthy design and development work and will ensure that the product and service are available to customers promptly.

The minimum viable product for the venture will include the following:

- Solar panels
- Installation bracket on the roof
- Wiring
- Renewable solar inverter

- Communication Module

The proposed business model aims to install and maintain renewable energy infrastructure for consumers through a small-scale embedded generation approach. The installed infrastructure will be owned by the venture with the consumer only paying for the energy used.

The implementation of the minimum viable product will enable the venture to receive the required feedback for future development of the various aspects and key activities of the business model. These can include partners, key resources, customers, channels, and value propositions. Through the feedback from the first offering, the venture can then grow and systematically introduce other services and value propositions over time. These additional offerings could potentially include battery storage, residential off-grid solutions, and renewable lighting solutions.

2.7.2. Channels

Channels describe how an organization plans to communicate with its customers and how it plans to reach the customers in the different customer segments to best deliver on the value proposition (Richter, 2012). The venture seeks to use various print and electronic media platforms to best advertise the venture's service offerings to customers. Furthermore, the venture will rely on word of mouth from other organizations that are now deriving value from product offerings.

The consumer will also be provided with real-time information on generation and energy consumption to enable proactive management of usage. The venture will require the consumer to share load consumption data and load management strategies to best develop the required value proposition and tariff structure.

2.7.3. Costs

The business model considers the costs required to produce the value proposition versus the revenue derived from the value proposition to inform the

venture's revenue model (Richter, 2012). The costs to be considered in the venture are as follows:

- Capital Costs
  The study will develop in detail the equipment and installation costs for the embedded generation units which are eventually considered as the input capital costs required for the venture.
- Operation Costs
  The investigation will also develop and detail the costs associated with providing reactive and proactive maintenance costs for the venture. These will also include the costs involved in the operations of the venture.
- Selling Costs
  The study plans to investigate and develop the revenue and pricing model to be used for the consumers

2.8. Risks

2.8.1. Business Risks

The use of decentralized renewable energy solutions has various risks which need to be identified, managed, and mitigated for the success of the venture (Arnold & Yildiz, 2015). These risks include financial, technical, regulatory, market, supply, and competitor aspects which may affect the performance of the venture. Financial risks come about due to the high initial capital costs inherent in renewable energy and the risk of the venture not being able to meet its financial obligations. Furthermore, there is a risk in sourcing funding with favorable terms for this type of capital-intensive project within Eswatini.

The renewable energy space in Eswatini is still new and unregulated which creates uncertainty for the future of the venture. The venture plans to exploit this uncertainty and potentially influence any new regulations to be in line with the business model. The barriers of entry into the renewable market and electricity supply market will be investigated to determine the attractiveness of the venture.

The study also seeks to investigate the internal and external situational analysis of the venture. This analysis will enable the venture to best maximize the strengths and opportunities as well as identify and mitigate potential weaknesses and threats.

2.8.2. The envisaged strategic operational challenges

Operations are an integral part of ensuring that customers get the most value from services offered by the business venture. Envisaged operational challenges include the lack of technical skills within Eswatini which will be able to readily assist with the maintenance of equipment. The renewable energy market in the country is still small and critical spares are not readily available within the country. Further operational challenges include the safety of the installations from vandalism and theft incidents. Challenges to be faced also include failures in the energy meter which could potentially result in loss of revenue. These challenges are key to the success of the venture but will be tested and solutions will be devised as the venture goes through its start-up phase and grows.

Competent personnel with the specific required training will be used to maintain the equipment to ensure warranties are kept in place. The renewable energy equipment to be installed is expensive and the venture needs to ensure that they are working optimally for as long as possible whilst the required warranties are maintained. This will be achieved through developing and adhering to supplier-developed maintenance plans.

Weather conditions also pose a risk to the success of the venture. Prolonged cloudy weather could lead to reduced performance in terms of energy production whilst high ambient air temperatures also result in the reduced long-term performance of the panels as well as drops in efficiency. Hail and lightning also present a significant risk to the installation as hailstorms result in damaged PV modules whilst direct lightning strikes could result in damage to electrical equipment (Patt et al., 2013).

2.9. Competitor and Market Analysis

A business venture needs to look at its business and market and consider how to best position itself to remain competitive (Rigo et al., 2022). The local electrical utility is the biggest competitor to the business venture as they currently have the largest market share in the energy provision sector. The utility can source and generate power in higher volumes through conventional means and distribute to customers and achieve a profit by applying economies of scale. The venture aims to start with the customers that they initially target and have and exploit any future opportunities which may be identified. The venture then seeks to grow and expand organically whilst remaining competitive.

Renewable energy technology installers are the closest competitors to this venture. These installers provide and install the equipment on-site but do not operate the units. The venture's competitive strategy and scope is allowing the customer to use renewable energy as an input into its operations without having to operate and own it. The operation, ownership, and maintenance of the unit will lie with the venture. This makes the venture competitive as the consumer will not have to assign additional resources towards the operations of the solution but will pay a tariff to the venture.

This business venture is an innovation and new to the Eswatini energy provision market. This will mean that new competitors enter the market to try to outpace the venture in the event it shows signs of success. It is key for the venture to remain dynamic with its business model by timeously responding to changes in technology and competitors to ensure it remains relevant. This will be particularly key for the start-up stage of the venture.

2.10. Situational Analysis

A strength, weaknesses, opportunities, and threats (SWOT) analysis is a useful tool that can be used to summarize some of the key internal and external issues and capabilities which may be used by a venture to generate strategic options (Johnson et al., 2020). The following SWOT matrix depicts the relationship

between the venture's internal capabilities and resources and external environmental influences.

STRENGTHS	*Solar Radiation* – The Kingdom of Eswatini is located in an area with a moderate to high Global Horizontal Irradiation (GHI) measure ensuring there is enough solar energy for the investment (World Bank).
	Photovoltaic power potential – The Kingdom of Eswatini sits in an area with a high estimated energy conversion capability for a solar PV plant (World Bank).
	First mover advantage – Users of electricity buy electricity from the utility and a venture aimed at selling power directly to customers from solar would be a first.
	Lack of solar regulatory tax – The energy regulator and other regulatory authorities have not imposed solar tax for companies producing electricity. The lack of these taxes increases profitability.
WEAKNESSES	*PV Installation knowledge* – The venture does not have individuals with enough experience and the adequate experience required to install and maintain PV installations.
	Lack of financial capital – The new venture does not have the required capital required to invest in PV technology and other assets to use as leverage for a loan from a financial institution.
	Solar availability – Solar PV technology is only able to generate electricity during the hours of the day when there is sunlight. In the absence of sunlight, other sources like utility and battery storage are used.
OPPORTUNITIES	*Increasing cost of electricity* – There have been proposals forwarded for increasing tariffs in Eswatini, especially after the recent ESKOM tariff award. These increases make a cheaper electricity provider more attractive.

	Large potential customer base – There is a large commercial and industrial business customer base in the country available to be serviced by the business venture.
	Electricity demand and supply mismatch – There is a regional mismatch between the demand and supply of electricity creating the need for an alternative energy supply for businesses.
	Cost of PV technology decrease – A downward trend in the cost of PV technology has seen the installation becoming cheaper and a viable substitute for utility power over time.
	Eswatini security of supply – The long-term agreement of supply between Eswatini and ESKOM is expiring in 2025 with no guarantee for renewal. This presents an opportunity for an alternative energy supply to increase security.
	Climate change awareness – Organisations and customers are becoming more aware of the risk of climate change and the need for a different approach. This provides an opportunity for renewable energy solutions
THREATS	*Utility supply pricing* – The utility can use economies of scale to produce a unit of electricity at a low cost making it difficult for smaller producers of electricity to compete.
	Inclement weather – Weather elements including hail and high ambient temperatures provide a risk to PV installations and their efficiency.
	Solar PV installers – There is a threat of customers going directly to solar PV installers and running the units themselves as opposed to the business venture value proposition.
	Lack of energy efficiency initiatives – There is a lack of financial incentives and support for energy efficiency initiatives for companies in Eswatini. These initiatives would assist in considering the business venture as a viable option.

Table 1: SWOT Analysis

3. DATA COLLECTION AND ANALYSIS

3.1. Data Collection

Consumer behavior towards renewable energy solutions informs the willingness of consumers to adopt the venture's value proposition. To best understand consumer behavior the study needed to systematically collect data that would be analyzed to develop a conclusion. To achieve this, the study focused on a quantitative research methodology as a tool for collecting data from potential users of renewable energy within the target market segment. This methodology approach is best used for evaluating various constructs which can best inform the perceived value that a consumer may have towards the renewable energy solution (Sangroya & Nayak, 2017). The approach used analyzed the factors which affect the attitude of acceptance towards the business venture and how the various perceptions affect the attitude.

3.2. Surveys

Surveys were developed and used as means of data collection from customers that fall within the targeted market segment. The outputs of the survey data were then analyzed to find causal relationships between different variables (Masini & Menichetti, 2012). The surveys used were in short format and in the form of a questionnaire and were conducted by visiting potential consumers of the renewable energy solution.

Surveys are conducted to get a reliable reference which could be used to create conclusions and to create consensus with understandings from earlier research (Manjunath et al., 2014). The surveys conducted were used to verify the value that potential consumers place on converting to renewable energy and compare this data with earlier research into the value proposition.

3.2.1. Sampling

It is impractical to conduct research on the entire population making up the potential market segment however sampling can be used to best represent the

entire demographic (Victor et al., 2018). The target population used for the study were commercial and small-scale industrial companies in various locations and industries across the country. The investigation aimed to sample 40 potential consumers through the survey. It was impractical for the venture to conduct surveys with the 19000 existing small commercial and major studies but selected the 40 as a representative sample. The sample included organizations at varying stages of the business lifecycle as well as private and public sector organizations. The participants were selected based on regional location and included business classifications such as agriculture, chemical processing, education, commerce, mining, hospitality, and utilities to name a few. The respondents' monthly electricity expenditure as well as years in operation were also used as a selection criterion.

3.2.2. Data Analysis and Interpretation

The data collected for the study was quantitative and was sourced through a survey questionnaire. The responses in the questionnaire had numerical values which enabled the quantitative analysis of data using the SPSS program for statistical analysis. The results of the analysis were used to indicate the viability of the business venture.

3.3. Limitations of the Study

The study had two limitations. First, it only explained how consumer perceptions of renewable energy solutions could influence the consumer's intention to purchase the service as opposed to conventional solutions in Eswatini and beyond.

The other limitation was based on the type of consumers that the study will be targeting. Large industrial consumers and small residential customers were not included in the study as they do not form part of the target market segment for the venture. Residential customers have high volume and will require larger capital and operational costs whilst large industrial consumers bring in the need for regulations as they may require installed capacity which exceeds 1MW.

The following factors and rights were considered during the study:

- Right to confidentiality in responses
- Censoring
- Misrepresentation of research results
- Organisational size

3.4. Validity and reliability

The validity and reliability of a study are closely related but show different properties of a study. Validity refers to whether the study being carried out actually measures the behavior required and how well it measures that behavior (Sürücü & MASLAKÇI, 2020). The validity of the study enables one to make inferences based on the data and scores related to the topic being investigated. The study carried out by the venture ensured that the data assisted in measuring consumer behavior to help formulate valid results. Reliability refers to the extent to which a study will realize the same results if it were to be conducted in a similar environment at different times (Heale & Twycross, 2015). Reliability in the study was ensured by developing one survey which was used consistently for all participants.

Methodological triangulation is used in the analysis of the data where two methods are used to answer the research objectives (Heale & Forbes, 2013). The findings from each of the methods are compared to determine if the results converge to one solution or if they contradict. Contradictory findings may lead to a better understanding of the theory being investigated whereas convergent findings aim to increase the validity of the study through verification.

4. SURVEY ANALYSIS AND FINDINGS

The business venture carried out a survey exercise to establish the viability of a solar technology solution for businesses in Eswatini. The study aimed to capture a minimum of 40 responses for the survey. A total of 43 survey responses were captured during the data collection exercise. 9 responses were eliminated for being incomplete. The data analysis was done based on the remaining 34 respondent entries. The following section presents the findings and analysis from the survey exercise and further discusses the results in relation to the objectives of the business venture proposal.

4.1. Demographic Characteristics

The first step taken towards understanding and analyzing the survey responses is reviewing the demographic characteristics to show the type of respondents involved and whether they fit into the desired sample. The demographic characteristics further provide insight and further insight into the respondents captured in the study. The variables analyzed as part of the demographics include the business classification, regional operational area, number of years the business has been in existence as well as the industry the business operates.

Variable	Frequency	%
Region		
Hhohho	9	26.5
Lubombo	8	23.5
Manzini	15	44.1
Shiselweni	2	5.9
	34	100.0
Business Classification		
Large Commercial	12	35.3
Large Industrial	7	20.6
Small Commercial	9	26.5
Small Industrial	6	17.6
	34	100.0
Number of Years of Existence		
2 – 5 years	4	11.8
6 – 10 years	9	26.5
More than 10 years	21	61.8
	34	100.0
Average Monthly Electricity Expenditure		
E 1 001.00 – E 2 500.00	1	2.9
E 2 501.00 - E 5 000.00	1	2.9

E 5001.00 – E 10000.00	8	23.5
E 10001.00 and above	24	70.6
	34	100.0

Table 2: Demographic characteristics

Table 2 above shows that the survey was able to capture respondents from across all four regions in Eswatini with a major representation from the Manzini region (44.1%). Manzini region is the industrial and commercial hub of the country and is the center of most of the economic activities (Sihlongonyane, 2018). The Manzini region would be an ideal operational center and starting point for the business venture as a large market share falls within the area, providing the opportunity for the venture to grow organically with other businesses nearby.

Table 2 further shows that the survey participants were spread between the different sizes of commercial and industrial customers. The participants included a higher participation rate of large commercial electricity consumers who are ideal customers for the venture. A large number of participants (61.8%) are involved in organizations that are at advanced stages of the business cycle as they have been in operation for more than 10 years. These are companies that are well established and could be willing to review how they do business and source electricity to gain a competitive advantage over others. Over two-thirds of the participants (70.6%) currently have a monthly electricity expenditure exceeding E10 000.00 per month and would be considered high electricity users.

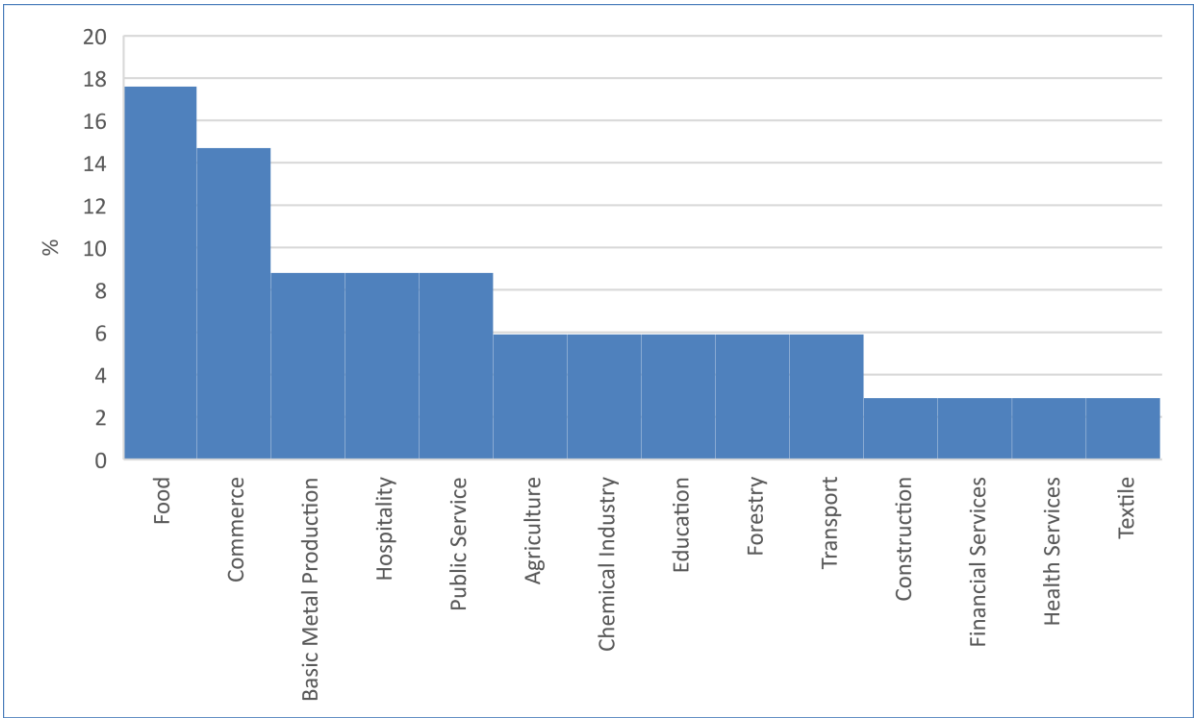


Figure 7: Survey participants by business industry

The figure above shows the results of the survey based on the type of industries that the participants come from. 32% of the participants come from the food and commerce industries.

4.2. Market perception on the uptake of solar energy solutions

The survey assessed the perception of various small to large businesses in the Kingdom of Eswatini towards solar energy solutions and the factors which influence their decision-making process towards converting to solar.

4.2.1. Solar energy perceptions and uptake

Variable	Frequency	%
Solar technology perceptions		
Neutral	2	5.9
No opinion	1	2.9
Slightly favored	13	38.2
Strongly favored	17	50.0
Strongly Opposed	1	2.9
	34	100.0
Please rate how strongly you feel your business is responsible for climate change and its current effects.		
1 - Least	4	11.8

2	6	17.6
3	9	26.5
4	11	32.4
5 - Most	4	11.8
	34	100.0

Table 3: Solar energy perceptions and uptake

Table 3 above shows that a majority of the participants (88.2%) are either strongly or slightly favored towards solar technology as a whole. The positive thoughts and impressions shown by the participants show a good perception of the technology and a potential willingness to utilize the technology. The participants further showed that their organizations were somehow responsible for the ongoing climate change and the current effects being experienced. Organizations which feel responsible for the effect they have on the environment may be willing to spend on or partake in initiatives to reduce their carbon footprint.

4.2.2. Benefits of solar energy

The survey further sought to establish what the respondents felt were the main benefits of utilizing solar energy for their businesses. Figure 8 below shows the top-rated benefits by the respondents with the larger blocks showing benefits rated higher.

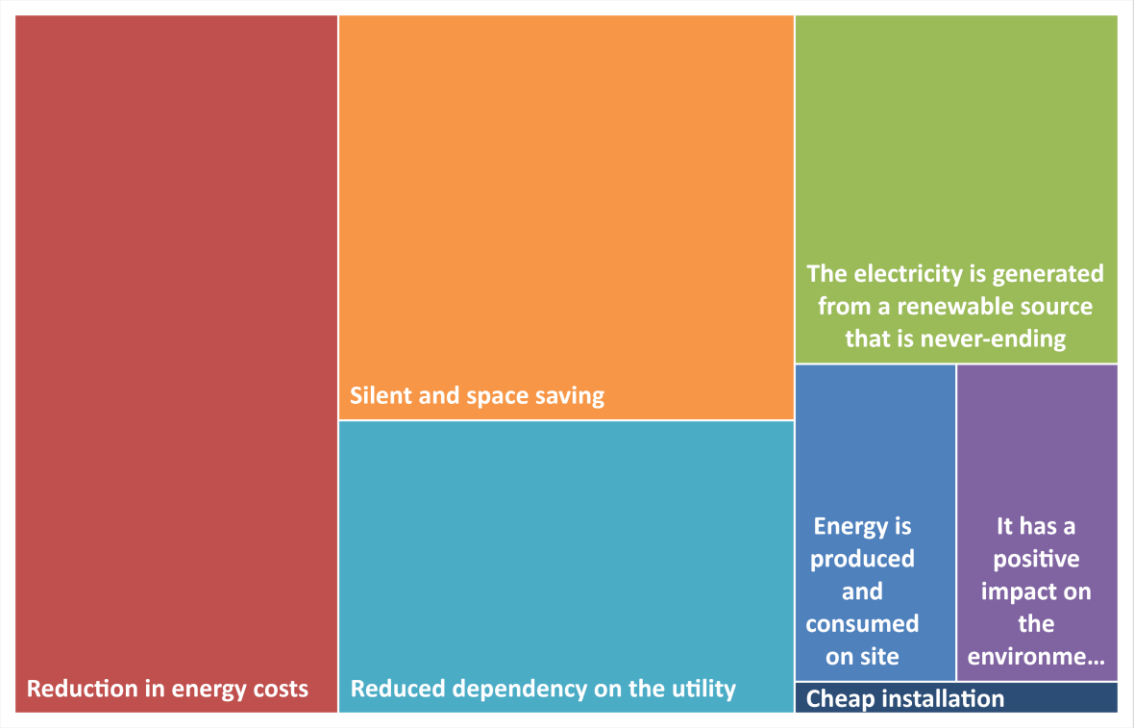


Figure 8: Respondents' rating of solar benefits

Participants in the study perceive that a reduction in the cost of energy for the business is the main benefit of a solar energy installation. The anticipated reduction of energy costs as a benefit increases the potential uptake of a solar technology provider that can be able to ensure a reduction in energy costs for the consumer. The business venture seeks to achieve this for the potential consumer, especially in the face of proposed EEC and ESKOM multi-year tariff increases. A business venture proposing cheaper electricity becomes more attractive to businesses. The installations' ability to be silent and space-saving whilst also resulting in a reduced dependency on the utility are other top benefits perceived by the respondents.

4.2.3. Factors influencing the decision to switch to solar energy

The survey further assessed the impact certain factors may have in the decision-making process for them changing from using conventional utility-supplied energy to now integrating solar energy technology into their operations. A five-point Likert scale was used, and each level of measurement was rated from 1 to

5 respectively starting with the least rating option (not at all, a little, small influence, major influence). An average of the numbers 1 to 5 was obtained and used as a cut value (decision mean of each statement being evaluated). Subsequently, the statement analyzed those statements which appeared to have a mean less than the cut value (calculated average) 3 which meant the respondents opposed the statement in question. Whilst any score that was equal to 3 or above (closer to 5), revealed that the respondents concur with the statement analyzed.

Statement	N	Mean	Std. Deviation
Cost of purchasing and installation	34	3.912	1.1110
Maintenance costs and processes	34	3.853	1.1582
Ease of switching between utility and solar supply	34	3.824	.9991
The appearance of solar PV technology devices	34	2.206	1.0084
Opinions of others (customers, friends, and family)	34	2.647	1.1516

Table 4: Respondents statement responses

The results in the table above show that the costs associated with the purchasing, installation, and maintenance of solar technology play a major influence in the decision-making process of the respondents. A cheaper solution would assist in swaying them towards utilizing the technology as an input into their operations. Respondents further feel that the ease for them to switch between electricity sourced from solar technology and that provided by the utility plays a significant influence in the decision-making. Furthermore, the respondents rated the influence of other stakeholders' opinions on the technology as well as the appearance of the solar PV technology as playing a very small role in guiding their decisions. The standard deviation values from all the statements indicate that a high proportion of the values from the respondent responses were clustered close to the mean and indicate a consensus across the board.

4.3. Consumer behavior toward the proposed business venture

The following section analyses the behavior of potential consumers toward the business venture offering and the current pain points they have with regards to electricity providers in the country. The analysis will assist in guiding the business venture toward meeting gaps in the market and picking the best competitive strategy.

4.3.1. Business consumer energy provision pain points

Respondents were asked to rank their current pain points concerning the service they receive from the utility.

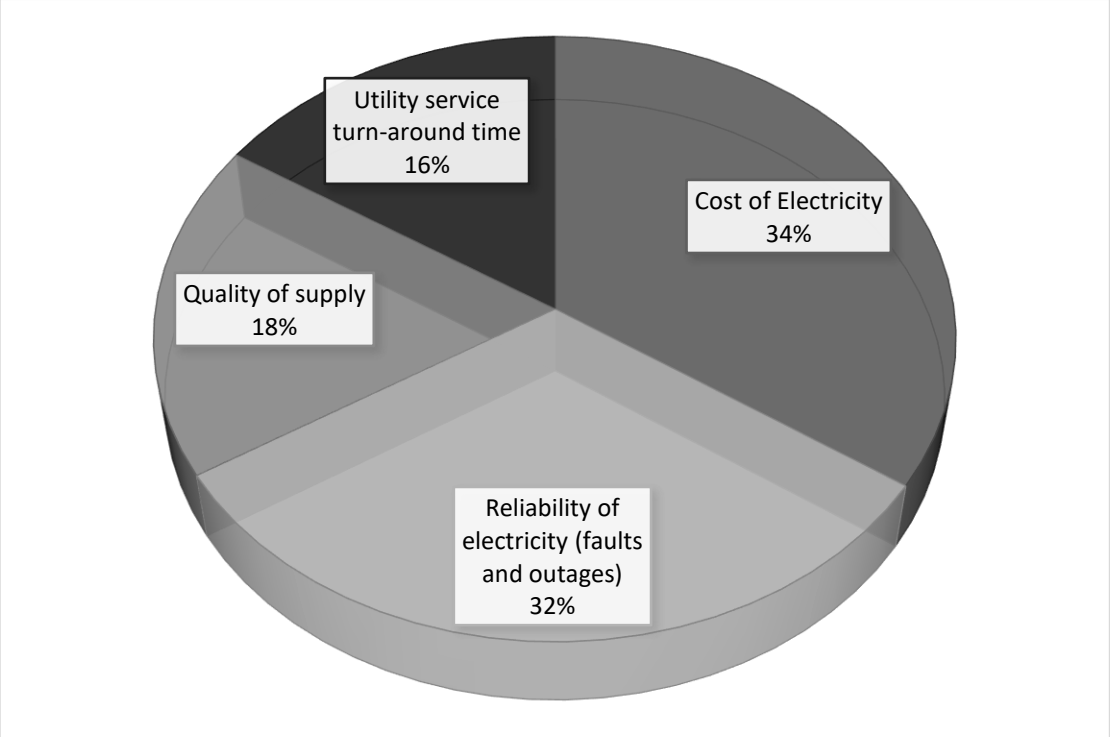


Figure 9: Respondents' pain points on energy provision

Figure 9 above shows that customers are currently unhappy with the amount of money they are spending on electricity. An alternative energy provider would need to address the cost issue by potentially providing a cheaper solution for the customer. Furthermore, the consumer rates the reliability of the utility system with regards to faults and outages as high. The proposed business venture counteracts this as the source of the energy will be at the same place as the point of consumption. This eliminates the faults associated with the transmission and distribution of energy thereby improving the reliability of the system.

4.3.2. Consumer behavior analysis

Table 5 analyses some of the responses aimed at measuring the behavior of potential consumers of the business venture.

Variable	Frequency	%
Is your company willing to pay more than the current utility price for electricity supply from solar energy?		
Definitely not	8	23.5
Probably not	13	38.2
Might or might not	5	14.7
Probably yes	4	11.8
Definitely yes	4	11.8
Total	34	100.0
The role the cost of electricity plays in your business		
A great deal	22	64.7
A lot	10	29.4
A moderate amount	2	5.9
Total	34	100.0
Has your company considered/implemented initiatives aimed at reducing electricity costs?		
No	7	20.6
To a certain extent	16	47.1
Yes	11	32.4
Total	34	100.0
Is clean energy use and environmental sustainability an organizational target for your institution?		
Definitely not	1	2.9
Definitely yes	8	23.5
Might or might not	10	29.4
Probably not	6	17.6
Probably yes	9	26.5
Total	34	100.0
How important is it for organizations to invest in solar power as a response to the energy crisis		
Slightly important	3	8.8

Moderately important	1	2.9
Very important	19	55.9
Extremely important	11	32.4
Total	34	100.0

Table 5: Consumer behavior analysis

The table above shows that a majority of respondents (61.7%) would not be willing to pay more than the utility price to be supplied by solar energy. This means that any other supplier of energy would either have to match the utility price or propose a cheaper tariff. The importance of providing a cheaper energy solution is further emphasized by the respondents highlighting that the cost of electricity plays a large role in the business and is seen as a major input. This highlights that a venture aimed at reducing these costs and reducing the burden on the consumer would result in an increased uptake.

Companies that have considered or implemented initiatives aimed at reducing electricity costs would probably be more inclined to engage in solar technology and take up the business venture offers. Furthermore, organizations that have set environmental sustainability as part of their organizational targets would be more likely to engage in the business venture and would be likely to have the funding to support this initiative.

Respondents are well aware of the ongoing energy crisis which has hit neighboring South Africa and has hurt most businesses. A large majority of respondents felt that it was either very (55.9%) or extremely (32.4%) important that organizations start investing in alternative energy solutions such as solar technology as a response to the energy crisis.

4.4. Survey analysis conclusion

The survey and analysis have shown that business consumers of energy in the country are predominantly unhappy about the current cost of electricity. The cost of electricity plays a major role in their operations and any reduction in this cost would assist in improving their profit margins. The survey further showed that

consumers are swayed by the costs associated with the installation, maintenance, and procurement of solar technology when deciding to convert. The survey highlighted that consumers have a positive perception of solar technology and that the benefits it brings could assist in addressing their pain points. The responses further indicated that there is a gap for the business venture in the market and there is a huge potential for future uptake of the business venture offering.

5. BUSINESS PROPOSAL

5.1. Business model

The TOWS model can be best used to model strategic options which a business venture may explore to gain a competitive advantage by considering the internal and external factors which have been identified (Johnson et al., 2020). The model creates links between the various elements of a SWOT analysis and the impact they may have on each other. These linkages and impacts are fundamental in ensuring the business strategy of any organization.

The TOWS matrix assists in identifying strategic options through the use of strengths to take advantage of opportunities and options which will assist in avoiding identified threats in the business environment (Dewanto, 2022). The model assists in providing a systematic way of converting the analysis conducted in the literature study into a working strategy. The use of the TOWS matrix ensures that the business model has plans in place to minimize, control, or avoid identified risks to the business venture by minimizing the weaknesses and threats (Dandage et al., 2019). These strategic options are critical for consideration as input into developing a business model for the business venture which will ensure it meets the needs of the potential customer as well as ensuring it has a competitive strategy.

The TOWS matrix is graphically represented as follows and highlights how the four elements of the SWOT analysis are combined to formulate various strategies based on four themes.

	INTERNAL FACTORS		
EXTERNAL FACTORS		Strengths (S)	Weaknesses (W)
	Opportunities (O)	Strengths + Opportunities (SO)	Weaknesses + Opportunities (WO)

	Threats (T)	Strengths + Threats (ST)	Weaknesses + Threats (WT)

Table 6: Internal factor

Strength - Opportunity (SO) Strategy: strategic ideas on how the venture can use its strengths to take advantage of the available opportunities.

SO1 – Solar Radiation + Photovoltaic power potential + large potential customer base + electricity demand and supply mismatch. The positive conditions available to the business venture to generate electricity from the solar market coupled with a customer and industrial commercial base which provides most of the revenue for the local utility provide the perfect playing field for a new competitor in the electricity supply market. Furthermore, the increasing mismatch between the supply and demand of electricity in the country positions the venture as a viable solution to the ongoing load shedding.

SO2 – The photovoltaic power potential in Eswatini coupled with the opportunity raised by the lack of electricity security of supply due to the upcoming import contract renewal presents an opportunity for alternative suppliers of energy in the Kingdom. Electricity suppliers which are not reliant on ESKOM and other areas facing electricity challenges are well poised as substitutes to the market.

SO3 – The venture may take advantage of the opportunity created by the decreasing trend of PV technology costs and the need for a more cost-effective supply of electricity due to increased tariffs by introducing solar technology to customers. A strategy that allows for cheaper supply to customers with possible lower yearly increases than the utility imposes positions the venture competitively.

Strength – Threat (ST) Strategy: Risk mitigation strategies of environmental threats through the use of strengths.

ST1 – The venture needs to minimize the risk of organizations not having energy efficiency incentives and projects by actively marketing the solar potential in the country and the potential benefits the organization stands to gain from taking on the initiative.

ST2 – Solar technology does not currently come with a tax expense due to its installation and use which further assists in making it a viable alternative as a response to the utility supply pricing. The lack of tax costs assists in making the venture more competitive in the market in terms of unit prices charged to consumers of energy.

Weakness – Opportunity (WO) Strategy: a strategic plan by the venture to overcome the weaknesses in the entity by maximizing the opportunities available.

WO1 – The venture may use the opportunity raised by the climate movement towards using alternative energy as a means to combat climatic change to assist in sourcing financing for the initial investment into the business venture.

Weakness – Threat (WT) Strategy: a defensive strategic plan by the venture to prevent threats and minimize weaknesses.

WT1 – A defensive plan to the lack of initial capital required to start the venture and the risk associated with the damage of PV technology due to inclement weather, the business venture needs to incorporate a comprehensive insurance strategy into its financial model.

The above strategies identified from the TOWS matrix give strategic direction to a business venture and assist in determining its competitive strategy. A competitive strategy details how a company aims to achieve a competitive advantage over others in its area of operation (Johnson et al., 2020). These strategies are driven by competitive advantages which must ensure that

customers see value in the product being offered and the value must be greater than that being offered by its competitors.

The competitive advantage may be achieved by competing on the cost by ensuring that the costs of an entity are lower than those of its competitors. The entity may also have services or products which are different from those offered by competitors. A competitive advantage may also be achieved by varying the competitive scope and appealing to a narrow customer segment as opposed to a broader customer base (Ormanidhi & Stringa, 2008). Figure 10 below graphically represents the generic competitive strategies available to organizations.

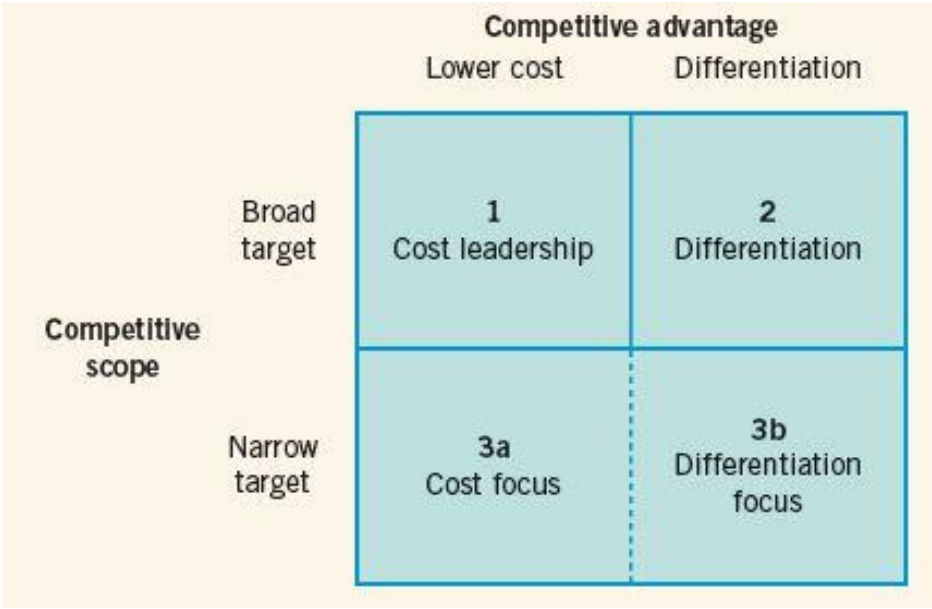


Figure 10: Generic competitive strategies

The proposed generic competitive strategy proposed for this business venture is the **cost-focus strategy** based on the following factors:

- Competitive scope (the vertical part of the two-by-two matrix) – The business venture does not aim to service all consumers of electricity in the country but is following a narrow target approach. The business venture's value proposition is aimed towards the businesses in Eswatini as they

provide the bulk of the revenue in the electricity sector. These businesses can go into long-term relationships with the venture ensuring sustainability. The long-term supply contracts which the venture seeks to engage in assist in ensuring the large upfront capital payments can be recovered from the customer over monthly payments included in the tariff whilst also ensuring that the venture has a return on the initial investment. The scope of the venture only focuses on using power supplied directly from the solar panel without the use of a battery backup supply. This is done to minimize the costs involved in setting up the plant.

- Competitive advantage (the horizontal part of the two-by-two matrix) – One of the main pain points for electricity consumers as highlighted from the survey is the increasing prices from the utility. The venture aims to implement a lower-cost approach to the market by offering businesses the option of utilizing cheaper electricity from solar PV technology. This is not an off-grid value proposition but one that allows the business to switch to cheaper electricity when it is available. The advantage of reduced costs is that businesses can consume more energy at reduced prices, therefore, bringing in more revenue for the venture.

The above strategy is aimed at ensuring the following for the customer as a value proposition:

- Supplying electricity to customers cheaper than the utility can during the day
- Providing security of supply options during the day
- Ensuring quality of supply of electricity from installations
- Becoming a trusted supplier of electricity to business customers
- Enables partnerships with other companies which are key to the value chain.

There are various initiatives that the business venture would need to consider and implement to ensure the success of the cost focus approach. These initiatives include the following:

- Sourcing financing from financial institutions geared towards green energy and sustainability initiatives. These institutions may have favorable interest rates and financing terms which allow the venture to charge a reduced cost.
- Creating long-term relationships and agreements with the manufacturers of solar panels and inverters across the globe to ensure that the venture sources the best technology with the highest efficiency whilst also being charged favorable prices for the equipment to lessen expenses.
- Creating a long-term relationship with local electrical installers and engaging them on a long-term service contract for maintenance work. This ensures that the expenses associated with the venture are minimized as the headcount and employee overheads are passed onto the installer. The electrical installers would be paid as per the work they do with the added advantage of a long-term maintenance contract.
- Equipment may be sourced in bulk from original equipment manufacturers and stored in the business venture premises. The advantages of buying in large quantities include large unit costs, support from the equipment manufacturer as well as reduced time taken for a new installation to be done. Further advantages include the reduced costs associated with third parties in the supply chain process.

5.2. Financial model

The financial model is one of the key inputs into the business venture which best shows the anticipated performance. It is based on a set of assumptions and factors related to business finance, operational metrics, and risks as input into the forecast. The financial model is a good tool to be used for a business venture looking at raising capital through investors or financial institutions.

The business venture seeks to utilize the cost focus strategy to attain a competitive edge when compared to other electricity suppliers in the country. This requires the venture to minimize costs and supply a product to a customer at a lower cost. The venture's main competitor is the local utility EEC. EEC currently

charges its business customers on a time of use (TOU) tariff with various charges per month (EEC, 2022). Before proposing a pricing and cost methodology, it is key to discuss how EEC currently charges the business customer per month.

Charge	Price
Facility Charge per month	1815.90
Demand Charge (E/kVA)	171.44
Access Charge (E/KVA)	58.31
Energy - Low Demand - Peak (E/kWh)	1.65
Energy - Low Demand - Standard (E/kWh)	1.17
Energy - Low Demand – Off-Peak (E/kWh)	0.94
Energy - High Demand - Peak (E/kWh)	4.71
Energy - High Demand - Standard (E/kWh)	1.44
Energy - High Demand – Off-Peak (E/kWh)	0.94

Figure 11: EEC Commercial/Business Time-of-Use Tariff 2022/2023

In Figure 11 we show the EEC time-of-use tariff which is made up of various charges to the customer that makes up the monthly bill total. A monthly facility charge is payable by customers as a fixed charge (E1815.90) regardless of whether electricity has been consumed on not. A maximum demand (E171.44) and access charge (E58.31) is also charged based on the highest apparent power (kVA) recorded as is charged for a year. Finally, energy-charged is billed based on the total electricity consumption during the month based on the time of day.

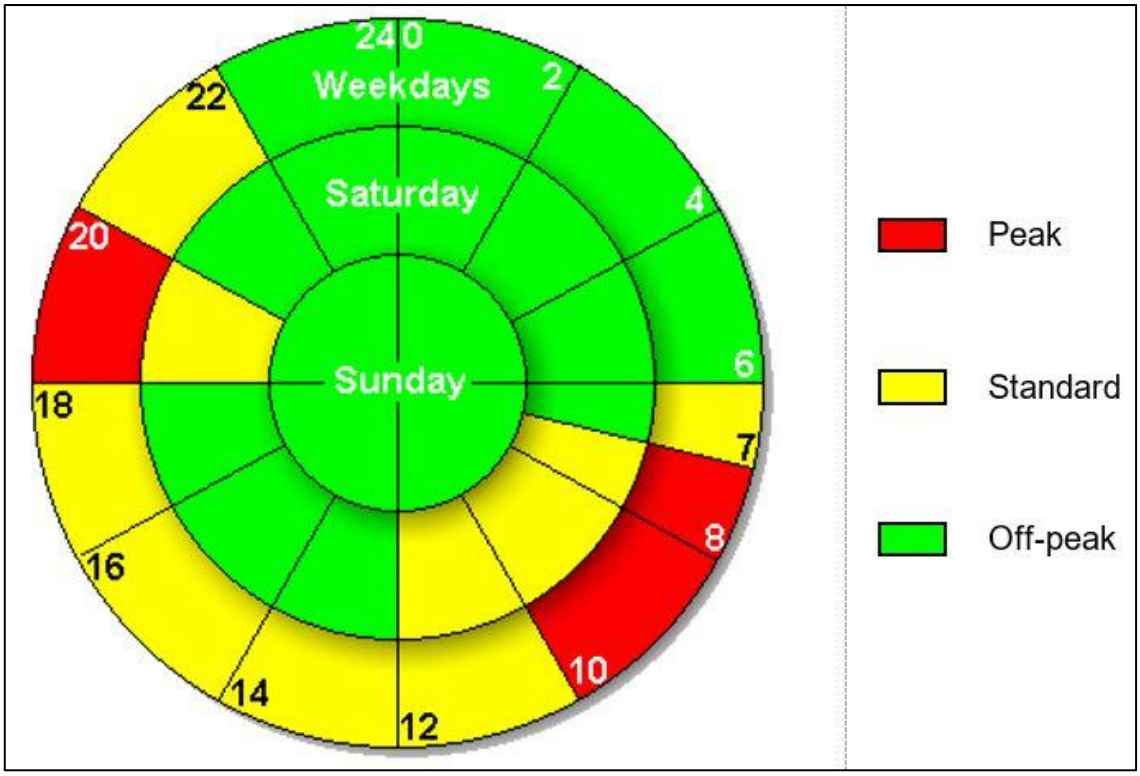


Figure 12: EEC Time of Use Wheel

Figure 12 shows the EEC time of use wheel shows the various times when customers are charged at various rates for their electricity consumption (EEC, 2022). These tariff rates vary by as much as 71 cents during the low-demand season and up to E 3.77 during the high-demand season. The high-demand season is during the months of June, July, and August. The time of use hours and seasons are as determined by the import agreements EEC has with power producers.

The financial model to be implemented for the business venture needs to meet the following requirements:

- Simple and easy to understand for all customers
- Generate revenue for the venture
- Eliminate time of use tariff and use standard energy charge
- Attractive rate of return for investors
- Long-term sustainability and profitability

- Annual increases linked to tariff increases awarded by the regulator

5.3. Financial calculations

The financial model consists of costs associated with setting up the plant, revenue collection from energy consumption tariffs, operational costs as well as cash flows. These assist in best modeling the performance of the venture. The financial calculations will be based on an analysis of one installation of varying sizes at different sites. It will model the performance and profitability of the different plant sizes.

Solar PV Plant Parameters:

Item:	Sizing:	Description
Solar Panels	600W each	High-efficiency panels with improved shading tolerance for improved production
Inverter Unit	165kVA/150kW industrial capacity	Equipped with 10ms change over system between utility and solar power. Also equipped with metering and remote monitoring functionality for customer billing

Table 7: Plant Parameters

Financial Calculations Assumptions:

The following assumptions and inputs were made when developing the financial model:

- The maximum demand fee to be charged to customers to 60% of the combined demand and access fees charged by the utility.

- Flat energy consumption rate to be used throughout the year
- Customers are to be charged at a rate equivalent to the off-peak rate charged by the utility (E0.94/kWh).
- Eswatini interest rate is currently 6,75% (CBE, 2023). This rate will be used to increase all future revenue rates in the absence of a tariff award.
- The prime lending rate for Eswatini is currently 10,25% and will be used to calculate the repayment of the capital investment for the plant (CBE, 2023).
- Eswatini inflation is currently 5,6% (CBE, 2023).
- Corporate tax for businesses is currently 27.5%.
- Operational Costs are variable and driven by revenue and are charged at 5% of revenue sales. These include electrical subcontracting fees and billing costs. The operational costs will increase yearly at an increase linked to inflation.
- Finance costs are fixed and calculated at an annual repayment amount for the capital investment amount at the current prime lending rate (10,25%) and paid back over 15 years.
- Depreciation is a fixed cost calculated at the anticipated 20-year lifespan of the installation.
- Overhead costs are fixed and not linked to the production output and are estimated to cover administration, personnel, and marketing costs. The overhead costs also cover the annual insurance fees for the installation to mitigate the risk of damage due to weather conditions. These costs are expected to increase at the inflation rate as the venture grows but will level out after a couple of financial years.
- Eswatini tax for business entities is charged at 27,5%

Solar power plants require sizeable capital investment to cover equipment, installation and commissioning costs. The following section will detail the initial setup costs required for 150kW and 900kW and also model the cash flow for the different-sized plants.

150kW/165kVA Solar Plant:

Item	Quantity	Unit Price	Total Price
Inverter Unit	1	429 000.00	429 000.00
Solar Panels	250	3 822.00	955 500.00
Installation Accessories			250 000.00
Installation Cost			408 625.00
		Total	**2 043 125.00**

Figure 13: 150kW solar plant setup costs

Figure 13 shows a breakdown of the capital investment required in setting up a 150kW solar plant. The breakdown includes the costs associated with procuring inverters, solar panels, accessories as well as the costs involved in installing and commissioning the plant.

	Units	Price	Total
Energy Consumption (E/kWh)	232248	0.94	251 060.09
Maximum Demand Charge (E/kVA)	144	137.85	273 935.52
Total Revenue			**524 995.61**
Operational Costs			62 999.47
Finance Costs			267 240.00
Depreciation			102 156.25
Overhead Costs			95 000.00
Total Costs			**527 395.72**
EBT			**2 400.11**
Tax			-
Profit			**2 400.11**

Figure 14: Cashflow projection for 150kW plant

Figure 14 shows the projected cash flow for the project in the first year. The revenue from the sale of energy to the customer is based on an energy fee charged as well as a fee linked to the maximum demand. Costs for the installation are broken down to include operational costs and costs associated with repaying

the initial capital investment and depreciation to the plant. Costs for the first year are seen to be marginally more than the revenue generated resulting in an initial loss.

	Year 1	Year 2	Year 3	Year 4	Year 5
Revenue	**524 995.61**	**622 907.29**	**702 265.68**	**749 668.61**	**800 271.24**
Operational Costs	62 999.47	66 527.44	70 252.98	74 187.15	78 341.63
Finance Costs	267 240.00	267 240.00	267 240.00	267 240.00	267 240.00
Depreciation	102 156.25	102 156.25	102 156.25	102 156.25	102 156.25
Overhead costs	95 000.00	100 320.00	105 937.92	111 870.44	118 135.19
Total Costs	**527 395.72**	**536 243.69**	**545 587.15**	**555 453.84**	**565 873.07**
EBT	**2 400.11**	**86 663.60**	**156 678.53**	**194 214.77**	**234 398.18**
Tax	-	23 832.49	43 086.59	53 409.06	64 459.50
Profit	**2 400.11**	**62 831.11**	**113 591.93**	**140 805.71**	**169 938.68**

Figure 15: 5-year Cashflow projection for 150kW Plant

Figure 15 shows the 5-year projection of cash flows for the 150kW plant. The first year may result in a loss but the following years present an opportunity for the plant to make a profit and return to shareholders. This cash flow outlook continues to look positive over the 20-year lifespan of the plant.

900kW/990kVA Solar Plant:

The following section covers the costs and analysis involved in a 900kW solar plant.

Item	Quantity	Unit Price	Total Price
Inverter Unit	6	429 000.00	2 574 000.00
Solar Panels	1500	3 822.00	5 733 000.00
Installation Accessories			1 300 000.00
Installation Cost			2 401 750.00
		Total	**12 008 750.00**

Figure 16: 900kW solar plant setup costs

Figure 16 shows a breakdown of the capital investment required in setting up a 150kW solar plant.

	Units	Price	Total
Energy Consumption (E/kWh)	1437005	0.94	1 350 784.51
Maximum Demand Charge (E/kVA)	891	137.85	1 473 892.20
Total Revenue			**3 248 378.22**
Operational Costs			259 870.26
Finance Costs			1 570 673.76
Depreciation			600 437.50
Overhead Costs			350 000.00
Total Costs			**2 780 981.52**
EBT			**467 396.70**
Tax			128 534.09
Profit			**338 862.61**

Figure 17: First year cashflow projection for 150kW plant

Figure 17 shows the projected cash flow for the project in the first year for the 900kW larger solar plant. The tax costs of the cash flow are based on the 27.5% tax percentage as imposed by the Eswatini Revenue Service. Revenue for the first year exceeds the costs incurred in the first year resulting in a profit for the venture.

	Year 1	Year 2	Year 3	Year 4	Year 5
Revenue	**3 248 378.22**	**3 854 200.76**	**4 345 225.93**	**4 638 528.68**	**4 951 629.37**
Operational Costs	259 870.26	274 422.99	289 790.68	306 018.96	323 156.02
Finance Costs	1 570 673.76	1 570 673.76	1 570 673.76	1 570 673.76	1 570 673.76
Depreciation	600 437.50	600 437.50	600 437.50	600 437.50	600 437.50
Overhead costs	350 000.00	369 600.000	390 297.600	412 154.266	435 234.904
Total Costs	**2 780 981.52**	**2 815 134.25**	**2 851 199.54**	**2 889 284.48**	**2 929 502.18**
EBT	**467 396.70**	**1 039 066.50**	**1 494 026.39**	**1 749 244.20**	**2 022 127.19**
Tax	128 534.09	285 743.29	410 857.26	481 042.16	556 084.98
Profit	**338 862.61**	**753 323.22**	**1 083 169.14**	**1 268 202.05**	**1 466 042.21**

Figure 18: 5-year cash flow analysis for 900kW plant

The 5-year projection of cash flows for the 900kW plant is shown in figure 18. The cash flow outlook for this investment continues to look positive over the 20-year lifespan of the plant.

Levelized Cost of Energy (LCOE):

The levelized cost of energy is calculated as the amount of money you will pay for each unit of energy that you will produce over the solar system's lifetime and can be used to compare different energy generation technologies (Hosseini et al., 2020). It is an important parameter to be taken into account when considering investing in a solar project as it depicts the cost of supply for the installation. The LCOE for this project is calculated over 20 years even though the installation is expected to produce energy well beyond this point.

150kW Plant LCOE = 0.63 c/kWh

900kW Plant LCOE = 0.56 c/kWh

Internal Rate of Return (IRR):

The internal rate of return is a measure used to determine the potential profitability of an investment based on the cash flows of the investment (Hartman & Schafrick, 2004). The IRR is used to express the percentage rate at which a unit of money can earn for the period it is invested. The IRR for both installations was done over 20 years.

150kW Plant IRR = 12%

900kW Plant IRR = 15%

Net Present Value (NPV):

The net present value is a measure of the present value of all future cash flows from a project after subtracting the initial investment made to a project (Gallo, 2014). It is a useful metric to use to determine whether to invest in a venture as

it calculates whether the investment stands to gain or lose. The rate of return for this calculation was assumed to be equal to Eswatini's inflation rate (5.6%).

150kW NPV = E 2 377 701.31

900kW NPV = E 20 916 735.59

Customer energy savings:

Figure 19 shows the energy cost charges, in Emalangeni, a customer may expect to pay for utility-supplied electricity as compared to solar PV technology electricity as supplied by the business venture.

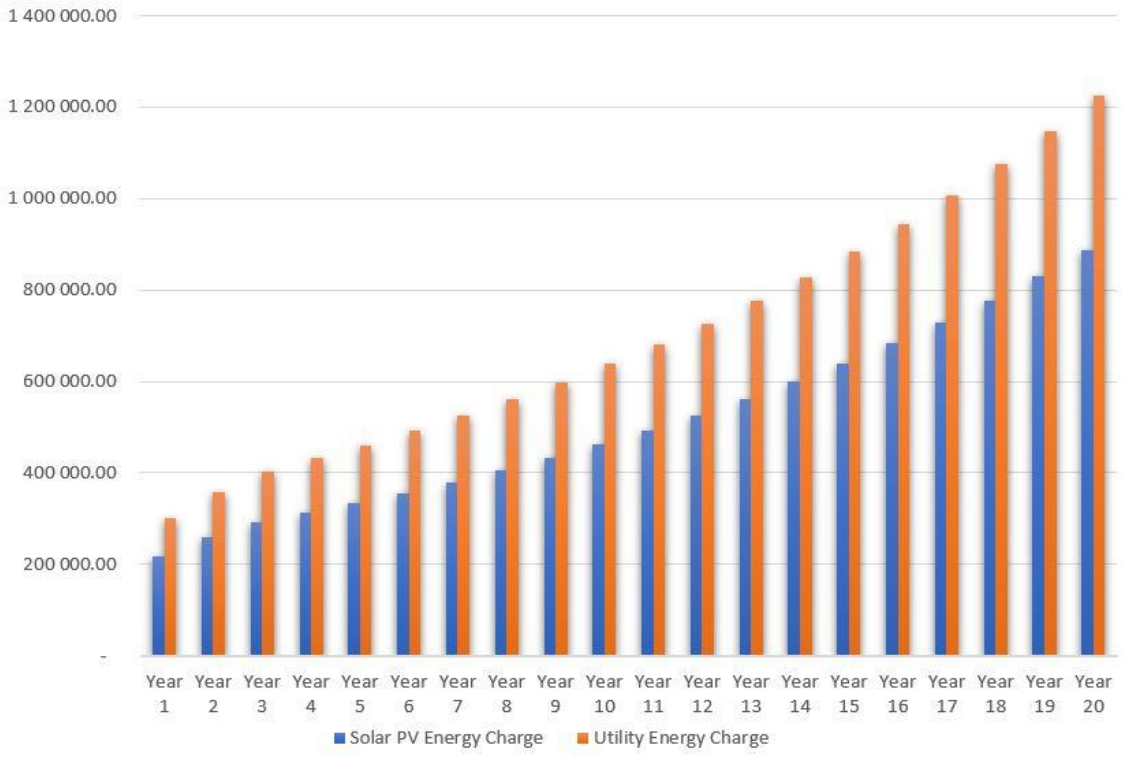


Figure 19: 150kW plant annual energy cost comparison

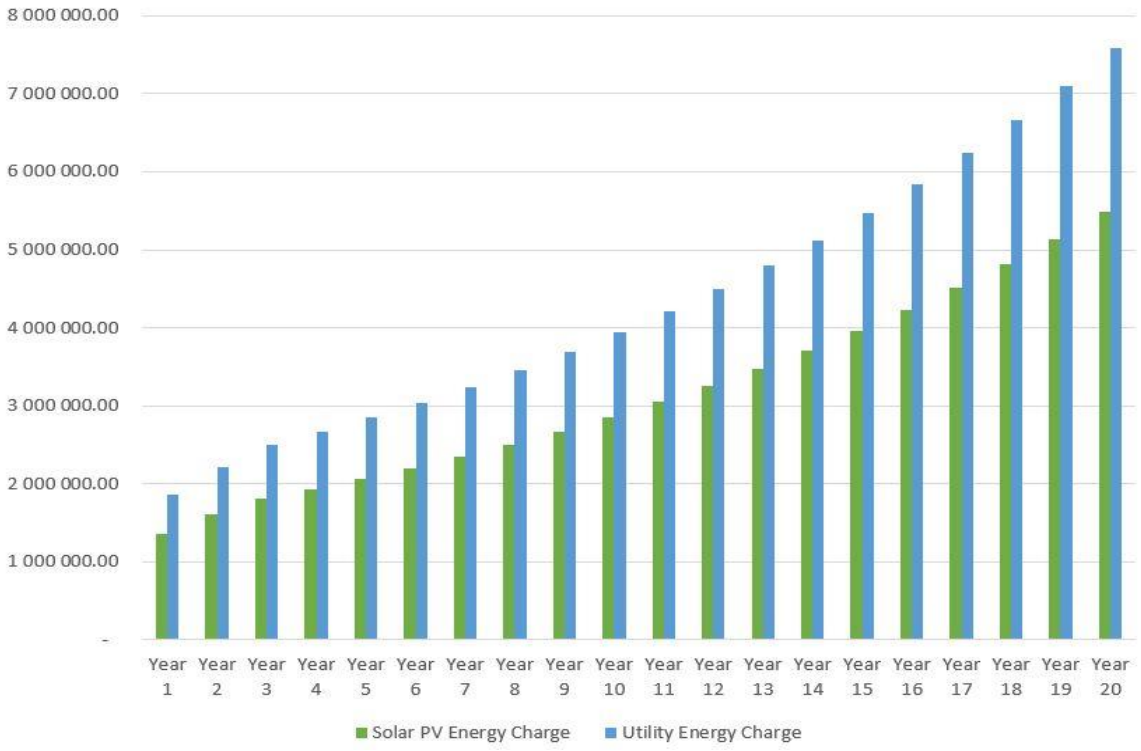


Figure 20: 900kW plant annual energy cost comparison

Figure 20 shows that the business venture results in energy cost savings for the customer due to the lower tariff price charged per unit of electricity. The energy costs for both solutions increase at the same rate due to the business venture price mirroring the utility pricing at every annual increase.

Calculations Summary:

The calculations above reveal that both the 150kW smaller solar plant and the larger 900kW plant are profitable long-term investments for the business venture to make. The first year of the 150kW installation may result in a loss for the venture but the annual increase in revenue and the fixed costs soon lead to a profit. The long-term profitability of the smaller and largest unit means that any installation within the operational scope of the business venture would return a profit as long as a long-term deal is reached with the customer. The revenue increase is mirrored by the awarded tariff increases and thereafter assumed to

increase at the current interest rate. Any tariff increases greater than the interest rate assist in further increasing the profitability of the venture.

The LCOE of the different plants is largely based on the capacity of energy generated and the initial investment made. The calculations show that higher-capacity plants have a higher LCOE when compared to smaller-capacity units. The LCOE calculated for both units is lower than the expected tariff to be charged to customers of the business venture (0.94c/kWh).

The two installations have an IRR which exceeds inflation. This makes them an ideal investment vehicle for an institution looking to grow their money over the long term with a relatively low level of risk. The NPVs for both installations are positive and further show the viability of the business venture and the potential returns they have.

The calculations show that the larger solar power installation presents a higher rate of return for the business venture as the 900kW installation has a 19% IRR when compared to the 15% for the smaller 150kW. Both installations have attractive potential returns which make for viable options for investment when also considering the low-risk nature of the investment. This is also shown by the IRR exceeding the current interest rates

5.4. Business proposal conclusion

The output of the TOWS model as well as the competitive strategies available to the business venture show that the cost-focus strategy is the most viable option available. The financial calculations around providing customers with cheap electricity from the installations prove that the investment will still make a healthy return for shareholders. The lower cost of electricity will meet the needs of the customer and attract other possible consumers. However, to achieve this, the venture needs to create strategic alliances with solar technology providers to ensure equipment is supplied at the cheapest possible costs whilst ensuring quality is not compromised and also ensure that long-term contracts are entered into with potential customers.

6. CONCLUSION

This chapter aims to draw conclusions based on the analysis and results of the previous sections. The chapter will have a section speaking to the conclusions of the business venture report followed by a section on potential future growth for the venture.

6.1. Report conclusions

The main objective of the research report was to investigate the viability of providing a solution by a business venture to the electricity challenges facing small to large businesses in the Kingdom of Eswatini. The business venture explored the option of introducing solar technology to supplement the utility electricity supply for customers.

The first aspect investigated during the report is the financial viability of the business venture. The report investigated and compared the financial performance of two solar plant installations of different sizes. The two installations were shown to be profitable and have a minimum 12% internal rate of return. The financial calculations showed that the cheapest cost approach can be taken by the venture and yet still be able to generate enough revenue to cover all expenses and financial commitments. The pricing for the energy produced by the venture will be based on the lowest cost approach with future increases mirroring electricity tariff increases. The viability of the business ventures hinges on creating long-term relationships with customers to generate enough revenue to cover initial capital investments. The investigation further showed that the larger-sized solar installation resulted in a lower levelized cost of energy and a higher internal rate of return which results in increased profits for investors.

The second aspect covered by the report was an investigation into the market perception that exists with the use of solar technology for businesses in Eswatini. The venture sought to investigate how small to large businesses perceive solar technology as an added solution to reduce reliance on the utility and also use the perception results as an indication of the uptake of the new technology. The study revealed that customers favor the introduction of solar technology and they

perceive the technology as a solution to high electricity costs they are experiencing and as a viable option to reduce reliance on the utility which comes with supply and reliability concerns. Businesses are starting to be more aware of the impact they have on the environment and the study showed that they perceive that solar technology may assist in reducing their carbon footprint. The investigation further highlighted that consumers feel that the costs involved in setting up and maintaining a solar plant as well as the ability to easily switch between utility and solar supply affects their decision to convert. The business venture addressing these perceptions and concerns would increase the uptake of the technology.

The third aspect looked into consumer behavior towards the proposed business venture value offering. The current pain points with regards to the current electricity supply market were evaluated to best position the business venture. Respondents highlighted that the cost of electricity as well as the reliability of the electricity supply were the main pain points. Furthermore, the respondents were opposed to paying more than the utility price for solar technology energy besides the added benefits the technology provides. Electricity is a major cost item for business and the respondents indicated that their organizations had started looking into initiatives aimed to reduce these costs. These companies which have already geared themselves towards reducing costs provide the opportunity for the business venture's value offering.

Finally, based on the findings highlighted above, the business venture concluded that there is a compelling case for implementing the solar technology solution for businesses in Eswatini. The cost-focus strategy is the best fit for the venture as it allows the venture to focus on the market segment providing the largest electricity revenue whilst having the least number of customers. The strategy enables the venture to supply electricity to consumers at a cheaper flat rate with improved reliability and use cleaner energy.

6.2. Venture future growth

The study focused on providing a solution for small to large businesses in Eswatini but there are future opportunities to be explored for the business venture to grow and increase its scope.

There is currently no legislation in place in Eswatini that permits consumers to sell back excess energy to the grid. This legislation will probably be developed to promote prosumers and as a response to the supply and demand crisis facing the region. The venture setting up larger plants for customers now presents an opportunity in the future to be a prosumer and supply energy to the utility as a future revenue stream. The venture would be positioned as one of the pioneers of the prosumer movement and could position itself as a leader in developing and negotiating terms with the utility and energy regulator. This would enable the venture to avail its services to assist other solar technology owners with the processes and negotiations involved in selling excess power to the utility at a consultancy fee.

The successful business venture could consider expansion into other southern African countries experiencing electricity supply issues as a growth strategy. The business model can be duplicated in other locations but the venture would come equipped with the industry knowledge, experience, and skills required to successfully set up a plant and negotiate a profitable tariff with customers and the local utility.

Lastly, the business venture may consider further vertical integration of its business model by partnering with solar technology manufacturers and setting up a plant to produce solar panels. This plant's products would service the local growing market as well providing an opportunity for export to other southern African and foreign countries.

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7. ANNEXURE

7.1. Survey Questionnaire

Dear participant

Thank you for taking time to participate in this study. I am a Masters of Business Administration student currently working on a research project about "***A renewable energy solution for small to large businesses in the Kingdom of Eswatini*** ". To this end, I wish to collect feedback on the usage and cost implications of electricity in your business as well as perceptions you may have on the use of solar energy to reduce energy costs in your business.

If you are older than 18 years old, are a manager within an Eswatini business, with decision-making and strategic roles in your organization; you are invited to participate in this study.

Do note the following:

1. Your participation in this study is voluntary. We will only include you in the study if you give us written consent to do so.
2. You can discontinue with the questionnaire at any point without adverse consequences
3. No personal questions or identifying particulars will be asked
4. The interviews will be dealt with confidentially
5. The original data will be stored in a secure location for a period of five years after which it will be destroyed.
6. Electronic datasets will be completely anonymized and stored for an indefinite period on a password protected computer.
7. Only the researchers involved in the project will have access to the raw data.
8. The dataset may possibly be utilized in future research, the same confidentiality will be applied in that instance.
9. The interviews will be recorded. It will then be transcribed by a transcriber which will also be bound by confidentiality. NO personal identifying information will be in the transcription. The original tapes and the transcription will be stored in a secure location for five years, after which it will be destroyed.
10. If you have any concerns or questions related to the study in general, or the items in the survey or interview, please contact the student, Cusilakhe Manana, email address: 0511383a@students.wits.ac.za; Telephone: +26876111092

Supervisor: Dr Lumkile Mondi

Telephone: +27117178262

Kind regards,

1. How best would you classify your business:
   - Small commercial ☐
   - Large Commercial ☐
   - Small Industrial ☐
   - Large Industrial ☐

2. How much are you currently paying a month towards electricity expenses:
   - E0.00 – E 1 000.00 ☐
   - E 1 001.00 – E 2 500.00 ☐
   - E 2 501.00 - E 5 000.00 ☐
   - E 5001.00 – E 10000.00 ☐
   - E 10001 and above ☐

3. In which region of Eswatini do you operate from:
   - Lubombo ☐
   - Manzini ☐
   - Shiselweni ☐
   - Hhohho ☐

4. Which industry are you operating in?
   - Agriculture ☐
   - Basic metal production ☐
   - Chemical industry ☐
   - Commerce ☐
   - Construction ☐
   - Education ☐
   - Financial services ☐
   - Food (drink, tobacco) ☐
   - Forestry (wood, pulp, and paper)
   - Healthy services ☐
   - Hospitality (tourism, catering, hotel) ☐
   - Mining (coal, ect.) ☐
   - Oil and gas production (oil refining) ☐
   - Postal and telecommunication services ☐
   - Public service ☐
   - Shipping (ports, fisheries, inland waterways) ☐
   - Textile (clothing, footwear) ☐
   - Transport 9civil aviation, railway, road transport) ☐
   - Transport equipment and manufacturing ☐
   - Utilities (water, gas, and electricity) ☐
   - ☐

5. How long has your organization been in operation:
   - Less than 2 years ☐
   - 2 – 5 years ☐
   - 6 – 10 years ☐
   - More than 10 years ☐

6. Which of the following are key pain points for your organization in terms of energy provision:
   - Cost of Electricity ☐
   - Reliability of electricity (faults and outages) ☐
   - Quality of supply ☐
   - Utility service turn-around time ☐

7. What are your thoughts and impressions around solar technology and its potential benefits:
   - No opinion ☐
   - Strongly Opposed ☐
   - Slightly Opposed ☐
   - Neutral ☐
   - Slightly favored ☐
   - Strongly favored ☐

8. Is your company willing to pay more than the current utility price for supply from solar energy:
   - Highly likely ☐
   - Somewhat likely ☐
   - Somewhat unlikely ☐
   - Highly unlikely ☐
   - Indifferent ☐

9. What do you understand are the main benefits of solar energy installations (choose 2):
   - Energy is produced and consumed on site ☐
   - Reduction in energy costs ☐
   - The electricity is generated from a renewable source that is never-ending ☐
   - It has a positive impact on the environment ☐
   - Reduced dependency on the utility ☐
   - Silent and space saving ☐
   - Cheap installation ☐
   - Boosts corporate social responsibility rating ☐

10. Statements

Statement	Not at all	A little	Small influence	Major influence
How much does the cost of purchasing and installation of solar PV technology influence your decision to switch to solar energy:	☐	☐	☐	☐
How much does the maintenance cost and processes of solar PV technology influence your decision to switch to solar energy:	☐	☐	☐	☐
How much does the ease of switching between the utility supply and solar PV technology influence your decision to switch to solar energy:	☐	☐	☐	☐
How much does the appearance of solar PV technology devices influence your decision to switch to solar energy	☐	☐	☐	☐
How much does the opinion of others (customers, friends and family) on solar PV technology influence your decision to switch to solar energy	☐	☐	☐	☐

11. How much of a role does the cost of electricity play on your business?
    - Insignificant role ☐
    - Small Role ☐
    - Main cost driver role ☐

12. Has your company considered/implemented initiatives aimed at reducing electricity costs?
    - Yes ☐
    - No ☐
    - To a certain extent ☐

13. Please rate how strongly you feel your business is responsible for climate change and its current effects:
    - 1 - Least ☐
    - 2 ☐
    - 3 ☐
    - 4 ☐
    - 5- Most ☐

14. Is clean energy and environmental sustainability an organizational target for your institution?
    - Yes ☐
    - No ☐
    - To a certain extent ☐

15. During which hours of the day is your organization in operation?
    - 24-hour operation ☐
    - 8am – 5pm (during the day) ☐
    - 12-hour operation (during and beyond the day) ☐

16. How important is it for organizations to invest in solar power as a response to the energy crisis?
    - Highly important ☐
    - Slightly important ☐
    - Not important ☐
    - No opinion

Thank you for participation!!